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## EAR - NOSE - THROAT

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No. 3.

# ORALISM AND AURALISM

A QUARTERLY JOURNAL DEVOTED EXCLUSIVELY  
TO PROBLEMS OF THE  
**DEAF AND DEFECTIVE SPEECH**

EDITOR

MAX A. GOLDSTEIN, M. D.

St. Louis

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**ORIGINAL COMMUNICATIONS.**

(Original Communications are received with the understanding  
that they are contributed exclusively to THE LARYNGOSCOPE.)

THE CLASSIFICATION OF DEAFNESS FROM THE  
STANDPOINT OF ITS PATHOLOGY,  
FUNCTIONAL TESTS AND  
PEDAGOGY.\*

DR. MAX A. GOLDSTEIN, St. Louis.

In the classification and differential diagnosis of types of deafness the early literature of otology affords us several homely standards. One of these is based on the recognition of two different functions of the organ of hearing—conduction and perception. It has been an accepted tradition to continue this differentiation of deafness of the conducting apparatus and deafness of the perceiving apparatus.

Our second fixed standard of recognition has been the empirical subdivision of the ear into three anatomical sections—(a) external ear, (b) middle ear, (c) internal ear.

Armed with these two fundamental principles, the literature of otology since its establishment as a recognized specialty has continued this classification and differentiation of deafness with orthodox persistency.

A better understanding of the anatomical details of the temporal bone, the numerous contributions and advances in the microscopic anatomy and pathology of the cochlea, the epoch-making researches of the past two decades in the functions of the static labyrinth, the

\*Presented at the Fifty-Sixth Annual Meeting of the American Otological Society, Atlantic City, May 15, 1923.

serious clinical and laboratory investigations in the problems of oto-sclerosis and the intimate study of the pathology and pedagogy of deaf-mutism together with a better knowledge of acoustics and its application to the hearing mechanism by means of tuning forks, high-pitched musical instruments and electric devices should place us in a position to discuss more exactly and more authoritatively the status of deafness, its classification into types and its final differentiation.

*Pathology.* Deafness due to a pathology of the conducting mechanism of the ear may still be classified in traditional form. We recognize the external ear and the middle ear including the membrana tympani, the ossicular chain ending with the foot-plate of the stapes and its articulation in the oval window and the surrounding aerated and mucosa-lined tympanic cavity as the definite conducting medium of a sound wave. Any mechanical interference or pathological change in any part of this conducting mechanism should be definitely classified as conduction deafness and the otologist should be able to maintain an unchallenged position in this group of cases.

The pathological difficulties that may arise in determining the presence of a known deafness with exactness are in the spongification of the labyrinthine capsule about the oval window as in oto-sclerosis or the change in the character or consistency of the endolymph after serous labyrinthitis, as both the foot-plate articulation in the oval window and the endolymphic fluid must still be regarded as part of the conducting mechanism. It is here that our clinical and functional tests and our understanding of the conduction mechanism of the ear are still vague. Much has been written about oto-sclerosis but we are still undecided as to its pathological entity. We have every reason to believe that a spongifying or sclerotic change in the labyrinthine capsule takes place; the point of most frequent attack seems to be about the foot-plate of the stapes; the membrana frequently shows no change in plane or luster other than a circumscribed pink spot over the promontory; • the tuning forks and Galton whistle give evidence of a diminished perception for both low and high tones; bone conduction is prolonged beyond the normal and paracusis is usually present in incipient cases. With these agents at our command, therefore, we should be in a position to definitely diagnose *clinical* oto-sclerosis. The progressive character of oto-sclerosis can only be determined by the increasing degree of deafness at both ends of the hearing scale and by the cessation of long-standing tinnitus.



From a purely clinical experience deafness may be classified in types, the basis of such classification being the associated clinical data found in these respective types. From an analysis of many authorities, text books and the observations of veteran clinicians, I present seven types or groups:

#### CLASSIFICATION OF CLINICAN TYPES OF DEAFNESS.

##### Group I. Lymphatic Type.

Lymphatic diathesis with hypertrophied tonsils, adenoids in the naso-pharynx, lymphoid nodules throughout the upper respiratory tract, pale and soft Schneiderian membranes with tendencies to frequent and various aerobic infections whereby a mechanical blockade of a more or less permanent character is developed in the tubo-tympanic tract, tissue metabolism changed and the functions of the conducting apparatus of the ear impaired.

Functional tests usually corroborate the clinical diagnosis of impairment of the sound-conducting mechanism.

With the better comprehension of the pathology and surgery of Waldeyer's lymphatic ring, much of the evil aftermath in this group has been held in abeyance. Prompt intervention not only removes mechanical obstruction to ventilation and sound-conduction, but also prevents the more serious adhesions, retractions, contractions and absorptions in the tympanic and tubo-tympanic areas where severe and permanent deafness may ensue.

##### Group II. Exanthematous Type.

As most of the exanthematas have their focal infection in a specific angina and as the local invasion so frequently includes the ear tract, we have a ready accounting for the frequency with which suppurative processes invade the tympanic cavity in this group. These suppurations seem to be of a specially destructive type for the membrana tympani is often sloughed in a large radius, the ossicles necrosed and the walls of the tympanic cavity eroded. Similar erosions are found about the fenestrae ovali and rotundae and these lead to permanent ankylosis or bony changes in this part of the labyrinthine wall.

It is a significant fact that many children with total deafness date their misfortune from an intense invasion of an exanthematous fever. Close observers have concluded that such invasions carry with them not only a destructive process centered in the tympanic cavity, but a toxic, selective attack on either a part of the labyrinthine structures, ramus cochlearis, or localized meningitis.

Careful functional tests in this group reveal impairment of both low and high ends of the cochlear scale and often simulate the clin-

ical tests of oto-sclerosis. There is this difference, however, between an incipient oto-sclerosis and an exanthematous invasion of the labyrinth: in oto-sclerosis the basilar and apical Corti cells are involved and a large part of the central scale still functions; in some types of exanthematous invasion of the labyrinth the cochlear cells may be intermittently and irregularly attacked, producing definitely recognized and still functioning tone-islands throughout the cochlear scale.

#### Group III. Central Type.

In epidemic meningitis, poliomyelitis and exanthemata with intense febrile reaction, we frequently find a sudden attack on the auditory central organ and total deafness. The following brief clinical report will illustrate: An intelligent, normal girl of sixteen was attacked Christmas day by epidemic meningitis with all of the characteristic symptoms of this infection; was seriously ill for a week, joined the family at dinner New Year's day, recovered from meningitis but totally deaf. Here again we note a selective localized meningeal-attack on the nerve trunk.

Functional tests with all forms of sound-producing apparatus, including tuning forks, voice, musical instruments and gongs failed to produce any sound impression. Even if the labyrinth end-organ has escaped attack, if both auditory nerves in their trunk have been toxically invaded and destroyed, the deafness must be complete.

#### Group IV. Oto-Sclerotic Type.

Much has been written about oto-sclerosis, but we are still undecided as to its pathological entity. It occurs less frequently in the child and the youth than in adult life, and the ensuing deafness is gradual in character, hence its popular term, "progressive" deafness. Heredity is an important factor in this type.

There are several clinical and pathological data which seem fairly constant in this group. We have every reason to believe that a spongifying or sclerotic change in the labyrinthine capsule takes place; the point of most frequent attack seems to be about the foot-plate of the stapes; the membrana tympani frequently shows no change in plane or lustre other than a circumscribed pink spot at the promontory; the tuning-fork and Galton whistle give evidence of a diminished perception for both low and high tones; bone conduction is prolonged beyond the normal and a paracusis is usually present in incipient cases.

#### Group V. Congenital Type.

One of the most serious factors in the production of profound deafness is that of congenital transmission. Interesting statistics

have been compiled showing the large percentage of total deafness evolved in the matings of the congenitally deaf and consanguinous marriages. We are here concerned not with a pathological but with a biological question. At a former meeting of the American Otological Society, I showed among a series of microscopic sections of the labyrinth, one of a congenitally, totally deaf child. The most interesting phase of this specimen was that the cochlear nerve in the labyrinth was shown to consist of only a nerve sheath and contained no vestige of neuroglia or nerve substance; the nerve presented the appearance of an empty shaft. Or, we may find a congenital atresia or absence of the external ear or of the tympanic cavity or its contents and a consequent undeveloped hearing mechanism. These brief descriptions illustrate my point of a biological absence of tissue rather than a pathological destruction or degeneration.

A functional test with tuning-forks and other sound-producing apparatus in this group elicits no response to any sound-perception, for if the cochlear or peripheral element is absent, no sensory impression can be conveyed to the cortical centrum according to our present interpretation of the theories of audition.

#### Group VI. Hereditary Type.

We should distinguish between the congenital type in which a transmissible absence of a part of the auditory nerve mechanism may be found and the hereditary transmission of a degenerative element as in rickets or syphilis. In syphilis the cochlear nerve or the ramus cochlearis may be present, but may have undergone sufficient degeneration in embryo or in early childhood to present a decided pathological entity.

Functionally such a differentiation could perhaps not be made by sound tests. Here we might avail ourselves of the Wassermann reaction, preferring spinal puncture to blood examination, and it is not unreasonable to hope, if such laboratory findings corroborate a syphilitic diagnosis, that an anti-syphilitic treatment may, even in cases of profound deafness, produce improvement in hearing.

#### Group VII. Mechanical Type.

Impaired hearing caused by recurrent coryza, deflected septum, hypertrophied turbinates, polypi (mucous or fibrous), adenoids, tonsils, malformation of the palate and choanae, chronic suppurative otitis media, large perforations of the membrana tympani, etc., where the mechanical influences of obstruction have not developed

permanent secondary pathology, such as adhesions, obstructions in the tube, necroses of the ossicles, partial destruction of the tympanic walls, may be classified as a separate group where the necessary surgical and therapeutic treatment may greatly improve the hearing and restore practical auditory usefulness.

An interesting problem to which I wish to direct special attention is the study of nerve deafness and changes in the character of the perceiving apparatus as they occur either in the central or peripheral nerve organs of the ear.

The literature on nerve-deafness is voluminous; the influence of tuberculosis, syphilis, alcoholism, consanguinity and heredity as a causative agent of such deafness has been described in interesting and valuable papers and monographs; the toxic effects of scarlet fever, measles, influenza, meningitis, whooping cough, typhoid fever and other systemic infections involving the central nervous system, thence the auditory nerve at the base of the brain, have been given much serious attention by many investigators. We confess, however, that the results of all such investigation and research have as yet contributed but little to the tangible and definite explanation of the pathologies that cause the types of profound deafness with which we are so intimately concerned. From this labyrinthian mass of literature, I have attempted a classification of nerve deafness into five groups, each group representing a different pathological process and a different prognosis when studied in the light of modern pedagogy and psychology.

#### CLASSIFICATION OF NERVE-DEAFNESS.

Group I—Deafness due to pathological changes in the end-organs or acoustic labyrinth, the tissues of the ramus cochlearis and distributions to the cortical hearing centers in the brain remaining normal. (Labyrinthine Type.)

Group II—Deafness due to pathological changes in the tissues of the ramus cochlearis or distributions to the cortical hearing centers in the brain, the acoustic labyrinth or sensory end-organs remaining normal. (Central Type.)

Group III—Deafness due to congenital absence or arrested development of a part or all of the filaments or branches of the auditory nerve in the acoustic labyrinth, the ramus cochlearis and distributions to the cortical hearing centers remaining normal. (Labyrinthine Type.)

Group IV—Deafness due to congenital absence or arrested development of the ramus cochlearis or its distribution to the cortical

hearing center, the acoustic labyrinth or sensory end-organs remaining normal. (Central Type.)

Group V—Deafness due both to congenital defect or pathological change in the ramus cochlearis or its distribution to the cortical hearing center and to congenital defect or pathological change in the acoustic labyrinth or sensory end-organs. (Labyrinthine and Central Type.)

#### THE VALUE OF FUNCTIONAL TESTS IN THE DIFFERENTIATION OF DEAFNESS.

A systematically and minutely conducted functional test of hearing is a valuable asset and one of the most important factors in otologic diagnosis and is also one of the most frequently neglected agents in the routine and working program of many otologists. In fact, I do not hesitate to state that the majority of otologists neither possess nor use four various pitched tuning forks for differential diagnosis. It may be remarked in passing that a differential diagnosis in the tuning fork range cannot possibly be made without the forks  $c^5$ ,  $c^4$ , Base C and Contra C.

In an open letter to the editor of the *Medical Record* an otological colleague, who is quite familiar with the value of tuning fork tests, writes:

"It seems to be the opinion of otologists working in our large Eastern clinics that tuning fork tests are of little or no use. Thus I found in one of the largest ear clinics of Philadelphia but three or four tuning forks and an old-fashioned Galton whistle. With this outfit it is absolutely impossible to determine either the upper or the lower limits of hearing. Small wonder then that in this clinic no case of oto-sclerosis had been diagnosed for seven years. In another large clinic in the same city it was stated that the tuning fork tests were made by the admitting clerk. After considerable effort, one tuning fork was found in this clinic. \* \* \* \* \*

\* \* \* \* \* In one of the largest clinics of New York a clinician informed me that tuning fork tests were valueless. His chief, overhearing the conversation, told me that they had a set of Edelmann forks, but did not know how to use them. It is to such ignorance of tuning fork tests that we owe the lamentable spectacle of patients with oto-sclerosis going to otologists for weeks and months of treatment until their money is all gone in a useless effort to improve an incurable condition."

To enumerate some of the possible conclusions to be drawn from careful tuning fork tests:

1. In suppurative processes in the temporal bone the determination of the degree of deafness is made possible only by such tuning fork tests. 2. An interesting prognostic point may here be cited. In an acute suppurative otitis media with invasion of the antrum and all the clinical features of mastoiditis, the tuning fork tests before operation indicated reduced air conduction, Rinne negative, Weber lateralized to the affected side. Two weeks after operation the same tuning fork tests are made and show: air conduction reduced, Rinne negative and Weber lateralized to the healthy side. The logical and definite conclusion drawn from the test with this one fork is that following the operation on the mastoid there has been an extension of the suppuration or infection into the labyrinth and either a serous or suppurative labyrinthitis has produced the ensuing nerve deafness, accentuated by the lateralization of the Weber test to the healthy ear.

3. An ear that still retains almost normal hearing in the presence of a chronic suppurative process can to a considerable degree be regarded as one not requiring extensive operative intervention.

4. In the course of a minutely conducted functional hearing test in a patient who complained only of gradually increasing deafness, we were enabled with but little other clinical data to diagnose an incipient bilateral acoustic nerve tumor.

5. With the Bezold continuous tuning fork series or with some modification of the musical scale as the Urbantschitsch harmonica or the specially constructed organ as used at Central Institute, we are in a position to accurately determine tone islands, their definite locality and their pedagogic significance. When these tone islands are within the range of the limit of perception of the human voice the pedagogic prognosis for developing such residual hearing in serviceable voice hearing, is hopeful.

The following table classifies the various types of deafness made possible by systematically conducted functional tests:

3858 Westminster Place.

	Otitis Med. Chr. Non-Supp. CATARRHAL	Otitis Med. Chr. SUPPURATIVA	OTO-SCLER
Membrana Tympani	Opacity; dimmobility; Calcar. deposits; retraction.	Central perf. in muc. sup. Marginal perf. in bone sup.	Normal or promontory hyp
Tuba Eustachii	Reduced lumen or stenosed	Patent. Occasionally contains muco-pus	Patent
T.F. Lower Tone Limit	Raised to C-c-c-1-c <sup>2</sup>	Raised to c1-c <sup>2</sup>	Raised to c
T.F. Upper Tone Limit	Normal	Normal	Reduced
T.F. Rinne	Negative	Negative	Negative
T.F. Weber	Lateralized to normal ear <i>affected</i>	Lateralized to normal ear <i>affected</i>	Lateralized normal ear <i>affected</i>
T.F. Schwabach (Bone Conduction)	Slightly prolonged	Slightly prolonged	Prolonged
Galton Whistle	Normal range	Normal range	Reduced
Static Labyrinth Reaction	Normal	Normal	Normal

Table of Functional Tests by Dr. M. A. Goldstein.



OTO-SCLEROSIS	OTO-SCLEROSIS and NERVE DEAFNESS	NERVE DEAFNESS. (Peripheral) Residual Hearing	NERVE DEAFNESS. (Central)
Normal or promontory hyperaemia	Normal or promontory hyperaemia	Normal or retracted	Normal or retracted
Patent	Patent	Patent	Patent
Raised to c <sup>1</sup> -c <sup>2</sup>	Raised to c <sup>1</sup> -c <sup>2</sup>	Occasionally perceived C-c <sup>1</sup>	Not heard
Reduced	Reduced	Some notes in scale perceived	Not heard
Negative	Indefinite	Positive or absent	Not heard
Lateralized to normal ear	Unreliable	No.	No
Prolonged	Diminished	Diminished	Diminished
Reduced	Reduced or not heard	Reduced	Not heard
Normal	Hypo-sensitive	Hypo-sensitive or absent	Inert





THE RESULTS OF THE FUNCTIONAL TESTS OF THE  
VESTIBULAR AND AUDITORY APPARATUS IN  
FORTY-FOUR CHILDREN WITH CONGENITAL  
OR EARLY ACQUIRED DEAFNESS.

DR. ARTHUR M. ALDEN, St. Louis.

For several years all pupils entering the Central Institute for the Deaf have been given a careful functional test of the auditory apparatus in an effort to estimate the amount of residual hearing, if any, that was present. This is often difficult or even impossible, due to the age of the child, its mental condition, lack of co-operation and other factors. In several cases where a reasonable doubt remained as to whether or not the child did have some remnants of hearing the teachers have spent many months in painstaking acoustic training only to determine finally that the pupil possessed no demonstrable acoustic function. In a field where trained teachers are so few and where the opportunity for teaching cases that have hearing and in which real results are obtained is so extensive this is manifestly a great waste of effort.

In as much as the reactions to the functional tests of the vestibular apparatus are entirely beyond the voluntary control of the pupil and are not in any way influenced by age it was thought that these might furnish at least an additional indication as to the presence or absence of cochlear function in doubtful cases. Accordingly forty-four cases have been carefully tested as to vestibular function and an attempt made to correlate the results with the previously made acoustic tests. The ages of the children in this group vary from four to nineteen years and of these twenty-six are girls and eighteen are boys. The causes of deafness as given by the history and as determined by our tests are, congenital, 27; meningitis, 5; scarlet fever, 5; diphtheria, 1, and doubtful, 6.

The technique employed was substantially the same as that suggested and carried out by Jones in his "Equilibrium and Vertigo".

*Rotation Tests.* The patient is seated in the chair with the eyes closed and the head inclined forward  $30^\circ$ , which puts the horizontal canals in the horizontal plane. The chair is then rotated to the right ten times at a speed of two seconds to each turn, making

twenty seconds for the ten turns, after which it is stopped. The patient keeps his eyes closed during the turning and is told to open them again when the chair is stopped. The direction, character and amplitude of the after turning nystagmus was carefully noted and its duration determined by means of a stop watch. After a wait of several minutes for cessation of all subjective sensations of turning, the patient is turned to the left ten times in like manner and his reactions noted. No effort was made to test the vertical canals by turning with the head back or forward. The subjective vertigo was determined by the past pointing in both the rotation and caloric tests.

*Caloric Test.* The patient is seated in the chair with the head forward  $30^\circ$  as in the rotation test. The ear is douched with water at exactly  $68^\circ$  F. A very small rubber covered nozzle is used so as to permit the tube to come well down into the small ear canal of the child and the stream of water to flow directly on the drum. All ears were examined before douching and any cerumen which might interfere with the test removed. No ears in which a perforated drum existed were douched. The length of time necessary to produce a distinct nystagmus was carefully noted and the cases in which there was no nystagmatic response after three minutes of continuous douching were considered as non-responsive. The eyes were then closed and the patient tested for pastpointing. The head was then turned backward to  $60^\circ$  and the conversion of the rotary into horizontal nystagmus noted. This of course retests the function of the horizontal canals. The galvanic test has not been done on this series of cases but will be made and the results reported at a later date.

The testing of the acoustic mechanism was done by means of the modified accordion which has a range of six octaves from Contra C to C<sup>4</sup> and the Bezold continuous tone series of forks, pipes and whistles. Records were kept on the special chart devised by Goldstein and published in *THE LARYNGOSCOPE* in 1921.

In considering these cases they have been divided, for convenience, into three groups, on the basis of the cause of their deafness; congenital, acquired and doubtful and those of the acquired group again divided into classes as to their known origin.

## CONGENITAL 27

Case	Vestibular Tests	Hearing	Case	Vestibular Tests	Hearing
19	No Reaction	—	35	Normal	+
28	No Reaction	—	37	Normal	+ +
33	Diminished	—	40	Normal	+ +
34	Diminished	—	43	Normal	+ +
36	Diminished	—	23	No Reaction	+ +
38	Diminished	—	20	Diminished	+
39	Normal	—	25	Diminished	+
44	Normal	—	27	Diminished	+
21	Normal	+ +	29	Diminished	+
22	Normal	+ +	31	Diminished	+
24	Normal	+ +	41	Diminished	+ +
26	Normal	+	42	Diminished	+
30	Normal	+ +	13	Diminished	+
32	Normal	+			

## ACQUIRED 11

	Case	Vestibular Tests	Hearing
Meningitis	2	No Reaction	—
	3	No Reaction	—
	4	No Reaction	—
	5	No Reaction	—
	14	No Reaction	—
Scarlet Fever	1	Diminished	+ +
	8	No Reaction	+
	9	Diminished	+
	10	Diminished	+ +
	11	Diminished	+ +
Diphtheria	7	Normal	+ + +

*Congenital Cases.* In this group of twenty-seven cases there were fifteen girls and twelve boys. Eight of these pupils had no demonstrable hearing and nineteen had residual hearing varying from slight sound perception to recognition of change of pitch of an interval of less than an octave. In the group of eight cases which had no hearing two had an entire absence of vestibular function, in four it was present but diminished and in two the vestibular apparatus reacted normally. In the group of nineteen cases which had residual hearing ten gave normal vestibular reactions, in seven the reactions were present though diminished and in one case with a fair amount of hearing there was an entire absence of vestibular response. From this data it will be seen that the fact that either the vestibular or the auditory end of the eighth nerve reacts, even normally, does not necessarily mean that there must be some function in the other side. While in sixteen cases the absence or presence of function was coincident in each portion of the nerve, in two cases we have normal vestibular reaction with no hearing and in one case considerable residual hearing with no vestibular reaction whatsoever.

A question seems natural at this time. How does it happen that in the twenty-seven cases of congenital damage to the acoustic mechanism ten cases still retain normal vestibular function and in the ten cases in which the vestibular reactions were reduced the reduction was nowhere as great as the relative reduction of acoustic function. In other words, why is the vestibular portion of the nerve apparently more resistant to congenital malformation than the acoustic portion? This may be explained on the basis of reversional variation. Developmentally the vestibular mechanism is very old, extending down the phylogenetic series below the fishes while the cochlea is a relatively recent addition. Accepting the fact that where congenital deviation from the normal occurs it is always to a more primitive type, and that the more recently acquired characteristics are those most vulnerable to change, then when a reversional variation occurs which affects the eighth nerve naturally the auditory portion is more often the seat of the change than the pars vestibularis.

*Acquired Deafness.* In this group are eleven cases, of which seven are girls and four are boys. Five of these were due to meningitis, five to scarlet fever and one to diphtheria. In each of the meningitis cases there is an entire loss of vestibular and acoustic function, no reactions whatsoever being obtainable by any sort of stimulation.

In the five cases following scarlet fever the vestibular reactions are diminished in four and absent in one while all show varying amounts of residual hearing. Deafness in three of these cases followed suppurative processes in the ears and in two the deafness was apparently due to labyrinthitis of either toxic or haemorrhagic origin. In these cases the vestibular and auditory portions of the nerve have both suffered damage which is usual in disease processes of this nature which involve the inner ear.

The case in which deafness was the result of diphtheria at the age of eighteen months give normal vestibular reactions and a considerable amount of residual hearing. This is difficult to explain on the basis of pathology. While it is theoretically conceivable that a toxic process might affect the acoustic nerves alone and the vestibular endings remain untouched, a more plausible explanation is that this was a case of congenital deafness which became manifest at that time.

The remaining six cases in this group are classed as doubtful because of lack of definite history as to the cause of the disease. Three of these show normal vestibular findings and in three vestib-



ular responses are present but diminished. All but one have demonstrable hearing. Probably most of these were of congenital origin.

The classification of a given case of deaf-mutism as either congenital or acquired might seem at first thought to be a comparatively simple task. No doubt if we could always obtain an accurate history of the case from the child's parents or the doctor the question of correct classification would be greatly simplified. Further, if we always obtained typical functional results for each group of cases, that is, if a congenital case always had some remains of hearing and normal vestibular reactions, or if an acquired case always resulted in complete absence of function, vestibular and acoustic, it would be a simple matter to place these cases each in its own category. However, it is a well known fact that the statements of parents and even of the physician in charge are very often to be taken "*cum granum salis*". Parents very often are reluctant to admit their children have been born deaf and usually attribute the deafness to some minor ailment which occurred during the early months of childhood, when the truth of the matter is that the child had been deaf from birth but this fact was only definitely established at about the age of two years.

Functional acoustic tests in these cases are only relatively correct. The discrepancies in these results vary greatly, depending upon the method and instruments used and the personal equation of the teacher making the tests. The harmonium as described above is probably the most reliable instrument for this purpose that we possess today. This is open, however, to the criticism that certain responses may be due to tactile impressions rather than actual air-conducted impulses. The continuous tone series of tuning forks is valuable in certain cases and within certain very definite tone limits. These again do not give a complete picture of the amount of residual hearing that is actually present. In all of our cases where both the tuning fork and harmonium tests were made the harmonium almost invariably showed a greater range of hearing than that depicted by the tuning forks. While this discrepancy is probably partly due to tactile impressions from the harmonium, there is another distinct source of error in this test. Alexander states that in a large percentage of the cases of congenital deafness in which pathological examinations were made of the cochlear apparatus that malformation of certain portions of Corti's organ and the nerve ganglia were present while other circumscribed areas appeared to be normal. In certain other areas only very slight deviations from

the normal were found. It is conceivable that in some of these circumscribed areas where only moderate changes have occurred, that the cells while still capable of function respond only to intensities greater than that of the normal. Or, in other words, although they are functionally active their intensity threshold is raised so that it requires an intensity much greater than the normal to produce a response. This conception is borne out by the correlation of our harmonium and tuning fork tests, for while the intensity of any given note on the harmonium may be greatly increased, the intensity for the same note with the tuning fork is fixed. The fact then that certain portions of the cochlea which apparently responded to stimulation by the harmonium and which were negative to tuning forks is accounted for on the hypothesis that those portions of the cochlea, non-responsive to tuning forks, have an intensity threshold which is raised above the normal. Perhaps some such apparatus as that recently devised by Dean and Seashore or that of the Western Electric Company, by means of which the intensity of any given pitch may be increased from zero up to pain sensation, may ultimately supplant our other methods of acoustic testing for classification as to amount of residual hearing.

Inasmuch as the responses to the functional tests of the vestibular apparatus are outside and beyond the conscious control of the patient, the instrumentation necessary for their performance and the technique can be definitely standardized, it would seem that these may offer valuable additional facts upon which to base a classification of these cases. A perusal of the literature reveals the fact that only a very limited number of deaf mutes have been carefully tested as to their vestibular reactions. Enough work has however been done to establish definitely the value of these examinations and it is confidently expected that when enough data has been collected that it will be found that the functional tests of the organ of equilibration will add materially to the classification that is now being developed of the various types of nerve deafness.

3858 Westminster Place.

## A NEW PLASTIC PROCEDURE FOR THE CLOSURE OF PERFORATIONS OF THE NASAL SEPTUM.\*

DR. JOSEPH D. LEWIS, Minneapolis.

Closure of old perforations of the columella presents one of the most difficult problems in rhinology; in fact, large perforations, and those following submucous resection of the septum (if not repaired immediately), are not remediable.

The success of a plastic procedure employed to close an old septal perforation is dependent on first, a correct application of geomet-

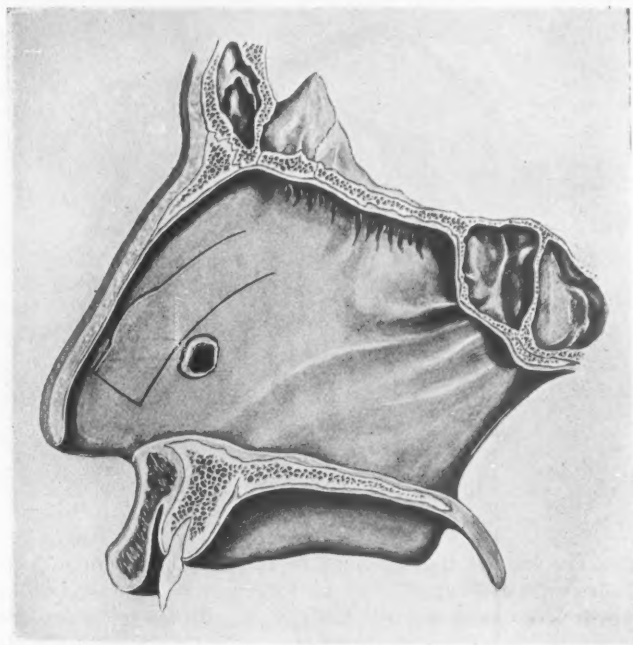


Fig. 1.

rical, mechanical and anatomic principles, and second, a simple and practicable operative technic. Hence, operations planned without full regard for these important phases of the problem are not likely to prove satisfactory.

\*Presented before the Minnesota Academy of Ophthalmology and Otolaryngology, November, 1922.

The factors which determine the result of a plastic closure of a septal perforation may be summarized as follows:

1. A mucoperichondrial flap, shifted from one part of the septum to cover a perforation at another, should be at least twice the diameter of the perforation, and of sufficient length to compensate for the post-operative edema (thereby avoiding tension on the sutures), and the ultimate contraction of the flap.

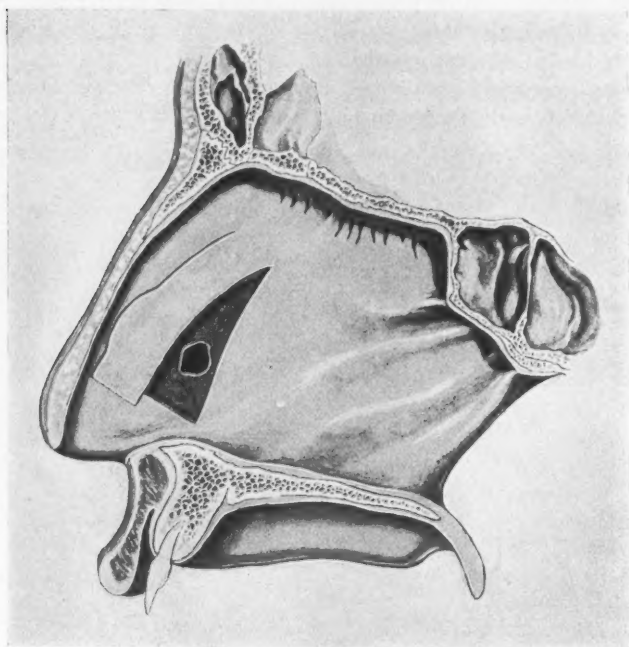


Fig. 2.

2. The base of the flap must be of sufficient width to assure an adequate blood supply.

3. It is essential that the cartilage, because of its avascularity, be removed from that portion of the septum surrounding the perforation in order that the flap will rest in contact with the vascular mucoperichondrium of the opposite side, to which it will unite as in the submucous resection operation.

Obviously, large perforations of the septum nasi are not amenable to plastic repair because the available tissue is insufficient for the purpose.

I wish here to present a detailed description of the technic of a procedure for the closure of favorably situated septal perforations of moderate size, which I have found very satisfactory, probably for the reason that the method meets the aforementioned requisites.

*Technic:* After the mucosa of the two surfaces of the septum has been cocaineized, a Simpson-Berany sponge is introduced into the nasal chamber opposite to that from which the plastic is to be cut. The sponge, moistened after introduction to cause it to expand, provides resistance to the instruments used for the operation. Two

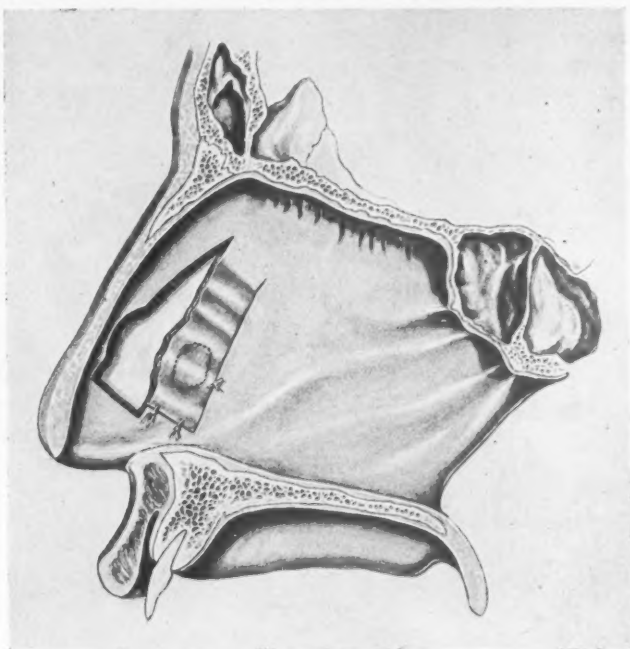


Fig. 2.

parallel incisions, as wide and long as the available tissue will permit, are made through the healthy mucoperichondrium and connected anteriorly by a vertical incision as shown in Figure 1. With a knife and superlatively sharp curettes, a triangular segment, including the mucoperichondrium and septal cartilage, is removed as indicated by the shaded area shown in Figure 2. The anterior third of the flap is then detached to facilitate introduction of the sutures, after which the elevation is completed and the flap is drawn downward into its new position (Fig. 3) by traction on the sutures.\*

\*The same procedure is equally applicable for the relief of intractable ulcers of the septum which resist other treatment.

When the septal perforation is high, the plastic must be cut from below and moved upward as 4.

The denuded area from which the plastic is taken heals by granulation from the margins.

At the conclusion of the operation the tampon is removed and similar ones, anointed with a ten per cent bismuth paste, are introduced into each nasal chamber. The packing serves to retain the

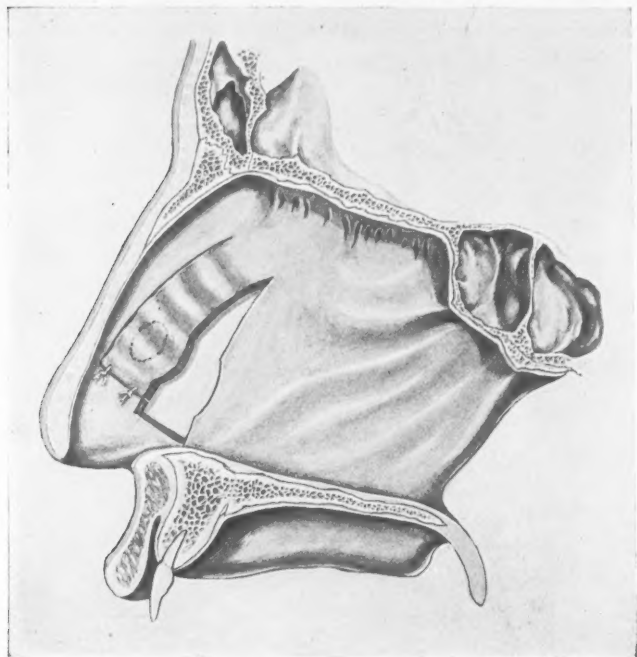


Fig. 4.

mucoperichondrial flaps in apposition, prevents the formation of blood or serum between them, and diminishes the edema. After forty-eight hours the packing is removed and replaced only in the operated side. The tampons should be changed daily and discontinued at the end of the sixth day following the operation. The sutures are removed on the eighth day.

La Salle Building.

## TREATMENT OF HEMORRHAGE FOLLOWING TONSILLECTOMY BY LIGATION.

DR. JOHN F. CALLAHAN, Brockton, Mass.

Much has been written of the treatment of hemorrhage of the tonsil fossa, and, judging from a perusal of the literature on the subject which has come to my attention, there has been little or no progress made in the treatment of hemorrhage following tonsillectomy, whether it be immediate post-operative, or secondary hemorrhage. Nature has indeed been kind to this department of surgery, for we all know that in no other part of the body could arteries of similar size be severed with such impunity and left to themselves. In the vast majority of tonsillectomies that I have seen performed in various clinics throughout Europe and this country, together with similar observations during service in the late war, in very few clinics have I seen any attempt to interfere with the hemorrhage. In fact, the majority of operators that I have seen seemed to be of the opinion that the operation was successfully concluded if they were able to demonstrate to the gallery the tonsil in its entirety with its shining capsule.

Some six years ago, I had the pleasure of listening to a discussion on the treatment of hemorrhage from the tonsil fossa, and several well-known laryngologists testified to the efficiency of one or more of the well-known astringents, as silver nitrate, tannic acid, perchloride of iron, etc.

About this time an article appeared in medical literature (if my memory serves me right, the original article was printed in the *Journal of the American Medical Association*) and the gentleman who wrote the article was a victim of epileptiform attacks. On two different occasions while in the unconscious state, he was assaulted by the appendectomy route, but successfully combated both attacks. In soliloquizing on the possible happenings of what the future may have in store for him if he suffered another attack, he felt no grievance against the perpetrators of the previous appendectomies and thought that he might reasonably feel safe if he should again fall into their hands, but his constant prayer was that if he was unfortunate enough to have another attack, that he would not fall into the hands of that class of surgeons who do not tie their arteries—the laryngologists.



From literature on this subject at hand, the present up-to-date treatment of hemorrhage in the tonsil fossa seems to be limited to holding a sponge in the fossa until the hemorrhage ceases. We have all seen hundreds of cases of tonsillectomy where the hemorrhage stopped of its own free will without any pressure from the sponge.

Application of hemostatic forceps to the bleeding points. I have seen on different occasions as many as five hemostatic forceps hanging out of a patient's mouth and kept on for several minutes. Some operators place deep sutures through the pillars and bed of tonsil fossa and have pleasant dreams that night, as they know the patient will not bother them with this protection (?). Others attach a Michel skin clip to hold pillars together.

The application of astringents immediately following the operation, such as tannic acid, perchloride of iron, peroxide, etc., still has many adherents. Thromboplastin, likewise applied, is supposed to make all bleeding points take back water at once. Coagulose, rabbit serum, and like preparations, are for cases where the coaguability of the blood is deficient.

In hemorrhage following tonsil operation, we are not, as a rule, dealing with this pathological state, but with a mechanical process, where an open tube—artery or vein—is allowing a constant stream of blood to flow into the throat. The only correct and surgical treatment of such a condition is to close the opening by tying the vessel, and any other treatment of the condition is non-surgical. Hemorrhage following tonsillectomy is not the simple affair that some laryngologists would try to make us believe. Deaths are recorded with quite a sufficient degree of regularity that might well make us ponder as to whether our armamentarium contains a solution for this very vexatious problem of post-operative hemorrhage. Very recently I have heard of two deaths due to hemorrhage following tonsillectomy.

Loeb<sup>1</sup> in a questionnaire sent to some 4,500 laryngologists on "Fatalities following operations upon nose and throat, not dependent upon anesthesia," received replies from only 250. Of the 332 fatalities reported by 250 laryngologists, 43 were due to hemorrhage following tonsillectomy, or about 13 per cent. Loeb further states that in his opinion there are many other cases that have not been reported. I have heard of ten fatalities due to hemorrhage following tonsillectomy occurring within a radius of 40 miles from Boston, and we may conclude that there must have been others that did

not come to my attention. As Loeb's questionnaire was confined to the laryngologists of this country, we may assume that about 66 per cent of the doctors who perform tonsil operations never heard of the questionnaire. While it is impossible to have all the cases reported, I think we can assume that only a very small percentage of the fatalities that occurred were included in Loeb's report. Even as it is, such statistics are invaluable, as it calls our attention to that fact that according to the law of averages, if we continue to do tonsillectomy that we must just wait the day when we will be confronted with that same vexious problem of an uncontrollable hemorrhage in the tonsil fossa.

The famed tonsil hemostat in its many varieties should not be forgotten, and I might state that if the individual who claims to be its inventor would delve into Chinese history, he might find in that unwritten volume of torture slowly inflicted by the Chinese, a description of an instrument similar to this, or a perusal of the notes of Torquemada of the Spanish Inquisition might show that this instrument was not first used as it is in this late day. The laryngologist, as a surgeon, must know that in the treatment of hemorrhage following tonsil operations, that the progress has been slow and that except in isolated spots the treatment is crude and, we might add, that it is nothing more than a prayer. If I were to have my tonsils removed, I am sure that it would be by some laryngologist who had something else up his sleeve besides a tonsil hemostat (old style) and a prayer, and I do not blame our friend who suffered the appendotomies for holding the laryngologist in such utter contempt.

Catching the bleeding point with a hemostat and securing the suture into the muscle below the hemostat, including the bite in the tie is a sure enough way to stop a hemorrhage, but it is slow work and really calls for two operations instead of one. The angles at which we must work at times makes it almost impossible to carry this procedure to a successful issue. In passing the needle into the tonsil bed an artery may be punctured by the needle, as arteries and veins may take a vertical course in the muscle bed. A fact that this practice has been discontinued by some laryngologists on account of the continued flow of blood through the stitch holes, leads me to believe we are very likely to cause a graver complication than the one we sought to remedy. H. Tilley<sup>2</sup> in a recent article says: "To tie a bleeding point is an elementary principle in surgery, whereas to sew it up in the surrounding tissue seems to me to be in the nature of a surgical offense. Nor do I sympathize with those who pass a needle deeply into the bleeding point and ligature it with a

quantity of investing muscular tissue because if sloughing occurs, we may produce the very complication we seek to prevent."

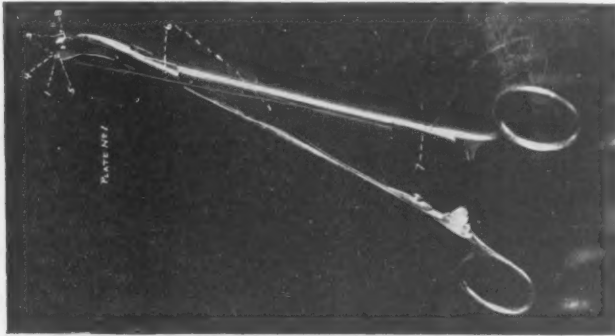
Boettcher has been a close student of that surgical principle in the treatment of hemorrhage in the tonsil fossa. While I have made use of the Boettcher method and use his ligature carrier, I have made an attempt to simplify the technique. As to the ordinary not ambidextrous individual, the Boettcher method is often a difficult procedure. I make no attempt to criticize the Boettcher method, as any individual who uses this method in applying such a surgical principle to the treatment of hemorrhage of the tonsil fossa is, in my opinion, beyond criticism. I presume that the average laryngologist of today is aware of the fact that he is supposed to be a surgeon and that the treatment of hemorrhage during an operation or a post-operative hemorrhage should be the same in the tonsil fossa as in any other part of the body, that is, where we are dealing with the soft tissues of the body.

What would our opinion be of a surgeon who sewed the peritoneum over a bleeding artery to stay the hemorrhage? As Shambaugh says in a recent article, we are all more or less creatures of habits. This may have its advantages, but also its disadvantages. One of the disadvantages is the perpetuation in practice of methods which an increasing knowledge has long since shown to be illogical and useless. I think that the laryngologist has arrived at a period in his surgical evolution when he might attempt some other treatment for hemorrhage in the tonsil fossa other than direct pressure.

Why leave a hemostat applied to a bleeding point for several minutes when we can better secure the bleeding point with a ligature in less than a minute? I have on several occasions heard laryngologists testify that they never had any hemorrhages in their tonsil operations and that they didn't think that it was ever necessary to tie the arteries to control the hemorrhage. To members of this specialty that belong to this group, I must say that they are just biding their time and that, according to the law of averages, they will learn with regret that disaster may accompany this simple operation of tonsillectomy by individuals who are unable to tie arteries in the tonsil fossa. As routine work I ligate all bleeding points in adult patients and send them from the table with a dry throat. In children I do not usually ligate unless there is unusual hemorrhage at the time of operation. Hemorrhage is liable to occur at any operation whether we use dissection and snare, Sluder, or La Force instruments. Secondary hemorrhage, occurring from second to twelfth

day after the operation, is likely to occur and is not influenced by the instrument that was used at the time of operation, as the pathology of thrombus, after the first day, is the same whether we used a La Force, snare, Sluder, or any other instrument.

I have attempted to perfect a hemostat that is as near fool proof as is possible. If you get the bite you can't miss the tie. In fact, with No. 12 or 13 twisted silk or No. 0 or 1 plain pyoktanin catgut, we can complete the tie before the hemostat is removed. The advantage of this is that in treating an emergency hemorrhage, we could complete the tie without the aid of an assistant to remove the hemostat while we would be completing the tie. My choice of material is the No. 13 twisted silk, as it allows us to use more tension



than does the No. 0 or 1 catgut and the No. 0 and 1 plain pyoktanin catgut. The fact that the gut is absorbed by tissues is not of any importance in the kind of material we use in tying of vessels in the tonsil fossa, as I find that they all become detached before they are absorbed and are either swallowed or expelled through the mouth. I have been using twisted silk for several years in ligating vessels in the fossa and have never noted any ill results from it. It seems that if the surgeon can bury Pagenstecher (linen) in the abdominal cavity that we could use silk on the surface.

The hemostatic forceps illustrated were devised for tying vessels in the tonsil fossa. The tonsil fossa is, without doubt, the most difficult place where surgical operations are performed to ligate arteries.

PLATE NO. 1.

1. Gripping part of jaw is limited to this small elevated part at extremity of jaw and is the same on both inner surfaces of jaws. It is of sufficient size to hold any bite obtained.

2. Space between the two jaws when instrument is closed is made possible by the elevated tips at gripping part of jaws.
3. Small clips posterior to gripping surface.
4. Space between clip and gripping surface for holding ligature material.
5. Note the lowest part of space between clip and gripping surface where ligature rests is on a level with the lowest part of gripping surface. This is important, as the tissue included in bite forces ligature between jaws below gripping surfaces into the space between jaws and ligature cannot be fouled by being included in the bite when instrument is closed.
6. Restraining pivot and spring, which keep instrument in a fixed position when instrument is threaded and open.
7. Spring clip where ligature is firmly secured.
8. Note pear-shaped tip as contrasted with the regular conical-tipped hemostat.

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## ON THE USE OF RADIUM TO INDUCE ATROPHY OF THE FAUCIAL TONSILS—HISTOLOGIC EVIDENCE.

DR. WALTER A. WELLS, Washington, D. C.

Within the past year or two considerable interest has been aroused in the laryngologic world by the claim of certain authors, radiologists in particular, that by the use of Roentgen rays in proper measure and correct dosage they could bring about a satisfactory atrophy of hypertrophied and diseased tonsils.

Evidence in its support has been derived almost entirely from two sources, viz., (1) changes in the appearances of the tonsil to the naked eye of the observer; (2) modification in the bacteriological content of tonsil cultures.

To pass judgment on the effect of a certain agent upon the tonsil requires not only keen observation, but due consideration of the various appearances which a tonsil assumes at different times and under different conditions.

I feel that an estimate, especially when made by a radiologist, or other person not intimately familiar with the various phases of tonsil pathology, may easily be misleading and unreliable.

Also with regard to the bacteriological test, it is certain that this cannot be taken as a safe index of tonsil pathology.

In the first place, the technical difficulties of estimating decrease and increase of bacteriological infection are such that too positive deductions are not permissible, and in the second place, notwithstanding the numerous painstaking investigation of the bacterial flora of these organs little of a definite nature has actually resulted.

It is true that from the excellent studies of Cabot, Billings, Davis, Rosenau, and others, we have now incontestable evidence that the tonsils are the most common seat of focal infection, and from these studies we are fairly certain that the *streptococcus viridans* recovered as a rule from the surface of the tonsils bears direct etiologic relation with inflammatory diseases of the endocardium and the pericardium, and that the *hemolytic streptococcus* recovered, especially from the depths of crypts, is the chief cause of arthritic infections. At the same time, however, we are compelled to admit that these organisms are frequently found in goodly numbers unassociated with the pathology mentioned, and that other organisms as bacillus influenza, bacillus diphtheria, and streptococcus pneumonia are often discovered on tonsils that are apparently healthy and unassociated with the diseases of which they are usually regarded as specific causes.

Furthermore, it cannot be claimed that there is any cultural or morphologic differences in organisms isolated from healthy tonsils and in those from tonsils associated with infection supposed to be of tonsillar origin.

With the virtues of the X-ray treatment resting upon such insecure basis, it is not surprising that there has been in recent months a steadily growing conviction of its failure to accomplish the results claimed for it, and so we are constantly hearing of cases of frequent repetition of the X-ray treatment ending finally in the much dreaded tonsillectomy.

The failure of the Roentgen treatment is largely traceable to the impossibility of concentrating a sufficient dosage upon the tonsils without producing a certain amount of damage to neighboring organs.

The X-ray in the technique employed by the Roentgenologist is applied to the outside of neck under the angle of the jaw, from which point to reach the center of the tonsil they must traverse an intervening area varying from two to four centimetres, according to the thickness of the neck.

Now these rays must follow the well known law according to which the intensity of action is in exact inverse ratio to the square of the distance.

Upon the surface we can get a proportionately very great effect, and as they travel inward the rays disperse and grow weaker, so that at four centimetres' distance we get only one-sixteenth of the dosage on the surface; moreover, the parotid and submaxillary glands may receive a dosage greater than that arriving at the tonsil, and this effect becomes clinically manifest in dry mouth and throat so often complained of by the X-rayed patient.

The author, about two years ago, began to experiment with radium with the idea of overcoming these disadvantages and drawbacks of the Roentgen ray in this particular field. The radium has the capital advantage that it may be applied direct to the seat of the disease, thereby securing the greatest concentration of therapeutic effect where it is needed and obviating the necessity of passing through an intermediate area of healthy tissue.

The radium salt contained within a specially constructed needle is inserted into the center of the tonsil parenchyma, where therefore the rays will act with greatest intensity, lessening as they pass to the periphery. We formerly used three needles to the tonsil, but latterly we have used the same amount of radium divided into two needles. Without losing the value of the cross fire, the introduction of two



needles has the advantage of less inconvenience in the procedure of insertion.

The wall of the needle we use is constructed of platinum and iridium, whereby all the irritant alpha and most of the beta rays are successfully screened and the danger of producing a burn is practically eliminated with an intelligent use of the agent.

The dosage will be regulated according to the character and the size of the tonsil, but we have found that the average person will take a 30 milligram dosage for one or two hours with but slight reaction.

This dosage will generally need to be repeated a second and perhaps a third time, but we advise that an interval of not less than two weeks should be allowed to elapse between each treatment.

Now a word with regard to radium and some of its properties:

Radium is the sixth element in the Uranium series having an atomic weight of 226.

It owes its therapeutic virtues to the fact that it gives off spontaneously and without cessation rays which have the power of penetrating the tissues and then setting up changes in the body cells.

The rays emitted are of three kinds, differing from each other in wave length, velocity, and power of penetration. First, there are the *alpha* rays, in reality nothing else than positively charged helium atoms, and they are shot from the radium with a velocity of 12,000 miles per second. One gramme of radium, it is estimated, will give origin to 145,000 billion of these particles every second.

The second order of rays are known as the *beta* rays, of which 71,000 billion are discharged each second from one gramme of radium. Their velocity is about ten times that of alpha, being about the equivalent of light, that is to say, 186,000 miles per second.

Thirdly, we have the *gamma* rays, which are electro-magnetic waves, or pulsation in ether with a very rapid rate of oscillation. They are almost identical with the X-ray of Roentgen, but are observed to have a somewhat shorter wave length, and the energy generated is more persistent than that of X-ray and less easily absorbed by matter.

Certain physical and chemical effects have been observed as resulting from radium radiation. They are, namely: (1) That of affecting a photographic plate; (2) the penetration of opaque matter; (3) production of heat and emission of light; (4) the phenomenon of phosphorescence and fluorescence; and (5) the power of ionization.

The last one is of chief interest to us from the medical point of view because it is probably to its ionizing influence that radium owes its power to produce changes in the body tissue.

Ever since Becquerel discovered that a little radium carried in the pocket could produce a considerable burn of the skin, its biological effect has been the subject of serious study and it has been learned that it can exert a profound influence not only upon superficial, but the deeper lying cells of the body, and can modify their nutrition, growth, and reproduction.

The effect upon the cell is manifested in its becoming swollen and then converted into colloidal mass capable of absorption and the nuclear chromatin upon which the influence seems especially to be exerted will be observed to quickly suspend activity and, in the case of prolonged exposure, suffer complete cessation of cellular multiplication.

With increased dosage and continuance of the same, there will occur eventually obliteration of the vessels from swelling of the intima with consequent interference of nutrition and *pari passu* with this process we will note proliferation of connective tissue and a tendency to fibrosis.

Of great significance and importance to us from a therapeutic standpoint is the observation of those who have carefully studied the biological effects of radiation is that all tissues are not equally affected, but that there is a different aptitude of different kinds of tissue to undergo change under these influences.

The skin, for instance, it has been long known, is much more sensitive than muscular tissue, and it has been observed that the genital organs were peculiarly susceptible and might have their physiological activity suspended by an exposure that would not injure neighboring structures.

A special sensitiveness of the endocrine glands is also claimed and used as a means of combatting hyperplasia and hyperfunction of the thyroid and of the pituitary.

Notably among the tissue to be classed as radio sensitive are the lymphoid structures.

It has been found, for example, that by either Roentgen or radium radiation it is possible in the case of lymphatic leukemia to bring about a disappearance of the ganglionic enlargements characteristic of this disease, and in myeloid leukemia to effect a decided reduction of the spleen, and that in both types of the disease there will be brought about a notable lessening of lymphocytes of the blood.

Bergondie and Trebandeau, in their studies of the biological effects of radiation, have evolved a law according to which it is claimed that the susceptibility of a cell is not only greater in proportion to its poorly defined morphology and function, but also more marked in proportion to its reproduction activity and the duration of karyokinesis.

Now, in the light of these theoretical considerations, it seems odd that the feasibility of influencing the tonsils has not been earlier recognized. Here we have organs that are to be regarded as, structurally, nothing more than a mass of lymphoid tissue enclosed in fibrous capsule which send into the substance trabeculae, dividing it into lobes and numerous compartments, and in the histological study of the organ the most striking feature is the formation of



Fig. 1. Untreated.

follicles which will be seen to exhibit all manner of mitotic and karyokinetic figures.

In order to properly estimate the therapeutic effect of the radiation of diseased tonsils, we should take into consideration the following: (1) Gross macroscopical changes in the appearance; (2) loss or diminution in bacterial content; (3) freedom from subsequent local disturbance; (4) freedom from systematic infection of focal origin; and (5) histological evidence of atrophy.

We have referred to the general inconclusiveness of the first two named criteria. With regard to the third and fourth, considerable time must elapse in order to be able to give trustworthy deductions. The object of paper is to give results of studies that have been made in the last mentioned point,—that is to say, histological changes in the structure which are seen to take place as a result of radiation.

The tonsils, as remarked, are practically little more than a mass of lymphocytes plus reticulated connective tissue.

The lymphocytes may be scattered loosely through the organ (diffuse lymphoid tissue) or gathered into round follicles or oval areas most thickly distributed in close proximity to the epithelial lining of the crypts.

In the periphery of the follicles the cells are seen to be packed with great density, leaving at the center an area of light shade due to a much looser distribution.

This lighter central area is known as the germinal center, where reproduction of new lymphocytes is in constant active operation, as shown by the mitotic and karyokinetic figures always to be seen.

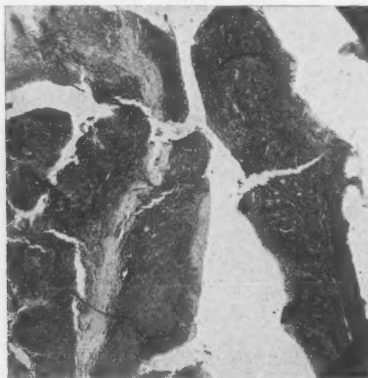


Fig. 2. Treated.

In addition to the lymphocytes, small and large, we find at the intersection of the fine interlacing cells of the reticulum a number of stellate flattened cells,—endothelial cells endowed with phagocytic properties.

The inner surface of the tonsils is covered with a stratified squamous epithelium and marked by a variable number of pits which are mouth of the recesses or crypts that extend deeply, sometimes branched and terminate by blind extremities close to the capsule. The epithelium lining the crypts is an extension of that of the surface, but, as Wood has pointed out, without subepithelial connective tissue and often no basement membrane, thus rendering it, in his opinion, very vulnerable to the invasion of bacteria.

The tonsils are covered externally by a thick fibrous capsule.

Extending from the free internal border of the anterior and posterior pillars are two folds, the *plica triangularis* and *plica retro-*

*tonsillaris*, which are pathologically important because of the marked variation to which they are subject and which have great influence in the conformation and development of the tonsils.

For the study of the histological changes induced by the action of the radium, a number of tonsils, after being submitted to a radiation of varying dosage, were removed at different intervals and submitted to microscopical examination. In several instances one tonsil of an individual was radiated and the other not, and both submitted for examination without specification in order to get an unbiased report. The difference between the two was so great as never to leave room for doubt. This is clearly shown in the illustration, with a radiated tonsil along side its non-radiated fellow. In the text,

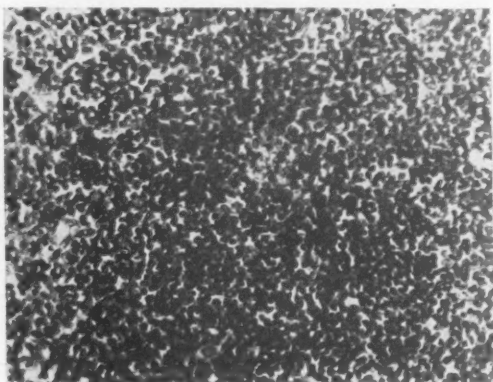


Fig. 3. Untreated.

to avoid tediousness, we have omitted the report of untreated specimens.

We are indebted to Dr. Oscar B. Hunter for the careful examination and detailed histological reports here given.

*Case I.* Mrs. F., whose right tonsil was exposed to ten milligrams of radium for one hour and removed for examination at the end of seven days.

The report of Dr. Hunter in this case is:

"(Specimen 6157). Crypts are irregular, ill defined, lined in some instances by partially atrophic epithelial covering, which, however, is quite highly vascularized and heavily infiltrated by lymphocytes in many places.

"The peripheral portion of the tonsil shows the presence of considerable granulation tissue, atrophy of the lymphatic elements and fibrous tissue replacement hyperplasia.

"There are many new blood vessels present and some recent hemorrhage, probably traumatic (removal).

"Toward the surface of the tonsil the follicles have apparently disappeared, but they are numerous toward the base. The lymphocytes show some degenerative change of a more or less chronic nature, but there is no evidence of rapid destruction or extensive necrosis present.

"In certain areas an excessive accumulation of eosinophiles is found."

Comment: In this case the dose is very small, compared with what we have been using as a therapeutic dose. Nevertheless, it was enough to bring about decided histological alterations all in the direction of atrophy.

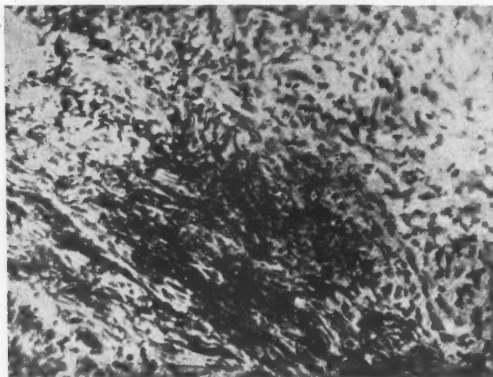


Fig. 4. Treated.

We note moderate disintegration of lymphocytes, disappearance of the follicle near the surface, fresh granulation production and fibrous tissue replacement.

*Case II.* Mrs. K. (No. 6615—Dr. Hunter.)

In this case the right tonsil had a single exposure of 30 milligramme one hour and removal for examination twenty-six days later.

Dr. Hunter's report follows: "Tonsil—Shows moderate number of ill-defined crypts, partly denuded of epithelium, compressed by swelling of the adjacent surfaces and heavily infiltrated by lymphocytes, many of which are free in exudate present in the lumina of some crypts; numerous follicles are present and show hyperplastic and hypertrophic changes with densely packed peripheral borders.

"The stroma is more or less densely filled with lymphocytes and scattered throughout there are many atypical condensations of these cells.

"Some cellular degeneration is present with young connective tissue replacement.

"There is no evidence of rapid destruction or dissolution of the lymphatic element, although there is some old hemorrhage and thrombosis of some of the small vessels at the base."

In this case the tonsils, which were greatly enlarged from hypertrophy, showed less change than the former, although the exposure and a longer interval before examination.

The changes noted consisted principally of the swelling of the lymphocytes, slightly cellular degeneration, and some connective tissue proliferation.

*Case III. Mr. R. (No. 6237—Dr. Hunter.)*

In this case we made two exposures to the right tonsil, one May 21, 1921, using 20 milligramme of radium for one hour and fifteen minutes, and a second May 25, using 30 milligramme of radium for one hour.

The result of examination of this tonsil, which was removed seventeen days after the last exposure, was as follows: "Microscopically an excessive widening of the crypts and a somewhat moth-eaten appearance along their borders; microscopically the crypts show almost complete denudation and loss of their epithelial lining; obliteration of the papillated arrangement with karyohexis and karyolysis of many of the remaining epithelial cells. Fig. 1-2.

There is a marked disappearance of the follicles, with obliteration or covering up of the germ centers.

The interstitial lymphatic tissue is shrunken and condensed and shows irregular atypical lymphocytic accumulations.

Many lymphocytes are necrotic and show karyorhexis and karyolysis with endothelial phagocytosis.

There are considerable number of new blood vessels produced, showing some enlargement and an endothelial proliferation.

This is accomplished by much fibroblastic formation and scar tissue production." Fig. 3-4.

Comment: The changes produced by radiation in this case in which the exposure was greater and two exposures made are striking and indicate well advanced atrophy; there was complete loss of epithelial lining of the crypts, general disintegration of the lymphocytes, obliteration of the germinal centers, and disappearance of the follicles, production of young blood vessels, and new scar tissue formation.



Indeed, the atrophic changes were so marked that they were even recognizable macroscopically, for with the naked eye one may note the widening of the crypts, obliteration of the follicles, and condensation of remaining tissue with fibrosis.

Incidentally, there was to be noted on microscopic examination a material decrease of the bacterial content by comparison with the non-radiated tonsil of the same patient, which showed masses and clumps of bacteria lacking or very sparsely present in the radiated organ.

*Summary and Conclusions:* The failure of X-rays to produce satisfactory results with the tonsils is to be attributed to the impossibility of concentrating a sufficient dosage on the organs without doing damage to neighboring or intervening structures.

Radium possesses the capital advantage of being introducidble into the center of the tonsil parenchyma, where its greatest influence is exerted, lessening toward the periphery. The study of the histological structure of the tonsil shows it to be made up largely of a mass of lymphoid cells, peculiarly susceptible to the effects of radiation, and therefore an ideal organ for this method of treatment.

That an actual decided atrophy can be induced is convincingly shown by the study of specimens of a radiated tonsil compared with its non-radiated fellow. This is indicated especially by the *degeneration and disintegration of the lymphocyte obliteration of the germinal cells, disappearance of the follicles, and shrinkage of interstitial lymphatic tissues, with general fibrous tissue replacement.*

It must be understood that no claim is made of the removal of the tonsils by the use of radium. The effect is that of an atrophy which we conceive to be analogous to that which occurs normally in all tonsils except when arrested by disease, in which the opposite tendency of hypertrophy is the prevailing characteristic.

The atrophy induced, while varying with individual types of tonsils, will in general be in proportion to the amount of radium and duration of exposure.

It follows, therefore, that by the increase of one or both or by a repetition of treatment we may bring the atrophy to as complete a state as required. As the walls of the container act as a screen, effective for the elimination of the caustic and irritant rays, and in consideration of the peculiar susceptibility of tonsil tissue as compared to surrounding structure, the danger of producing a burn by this method of using radium in intelligent hands is practically negligible.

815 Conn Avenue.

## STUDIES IN THE USE OF SUCTION IN DISEASE OF THE ACCESSORY NASAL SINUSES.

DR. MAX UNGER, New York.

The use of suction in diseases of the accessory nasal sinuses is so widespread that it behooves every one practicing rhinology to study the procedure, if only to be posted in all therapeutic measures of that specialty. When, however, there is marked (even acrimonious) controversy between eminent rhinologists over its usefulness, there is still greater reason for knowing its possibilities for good and harm. Lastly, when one takes sides for or against this procedure he should be especially well posted on the subject in order to be able to support his position and confound his opponents.

The writer felt for a long time that suction as practiced generally was useless and even harmful. This feeling was based on the observation in certain cases that suction failed to draw pus from the sinuses and caused hemorrhage and persistent edema of the nasal tissues (an edema that was particularly resistant to treatment with adrenalin, so that patients on whom suction had been applied had stuffed noses and spoke with a nasal twang for hours afterward). Moreover, the use of suction was accompanied by much immediate discomfort and even pain. The persistent advocacy of this method of treatment, however, by prominent nose and throat specialists showed that there must be more in its favor than the hypnosis produced by the hum of a beautiful and smoothly working piece of machinery. The writer, therefore, determined to make an exhaustive study of the subject in its various phases in order to determine whether suction was useful or harmful, and under what conditions good or evil resulted.

The study was begun with the theory in mind that, nature having provided suitable means to clear the air passages, artificial aids should be planned along the lines of nature's processes. A cough clears the lungs; a sneeze or blowing clears the nose. These processes are sudden, expulsive, and momentary. The forces used are usually adequate to accomplish the purpose, therefore the first observations were made to determine how much the air pressure (positive or negative) could be made to vary in the nose without artificial aid, and how these variations influenced the air pressure in the accessory sinuses.

This thesis accepted by the American Laryngological, Rhinological and Otolological Society.

Tests were made on fifteen patients, as follows: A nasal tip was fitted to a mercury manometer and put into one nostril. Readings were then taken while the other nostril was open during ordinary respiration, forced inspiration, and forced expiration. Then readings were taken with the second nostril closed under the same conditions. The table shows the results:

TABLE I.

	Ordinary Breathing		Forced Inspiration		Forced Expiration	
	2 nostrils	1 nostril	2 nostrils	1 nostril	2 nostrils	1 nostril
	mm. Hg.	mm. Hg.	mm. Hg.	mm. Hg.	mm. Hg.	mm. Hg.
1.	2	4	12	30	30	84
2.	3	6	10	26	14	70
3.	2	5	6	28	6	36
4.	4	8		32		30
5.	2	4	28	10	14	50
6.	2	6	10	24	12	36
7.	2	8	20	30	20	48
8.			14	76	20	40
9.	2	8	24	24	8	28
10.	2	4	6	12	16	30
11.	2	4	6	10	6	14
12.	4	8	24	64	20	86
13.	4	8	12	20	64	120
14.	2	4	8	28	10	54
15.	4	8	20	40	35	65

Briefly summarized, they are:

TABLE II.

	Both nostrils open. mm. Hg.	One nostril open mm. Hg.
Ordinary breathing .....	2- 4	4- 8
Maximum Inspiration .....	6-28	10- 76
Minimum Expiration .....	6-64	28-120

The great variations in pressure in different persons were no doubt due to differences in the size of the nasal air passages. The maximum figures under inspiration indicate what suction is created when a person sniffs strongly. The maximum figures under expiration indicate the force of the air blast created in blowing the nose.

We knew that the patient's maximum efforts in blowing the nose or in sniffing, except in cases of ozena, were sufficient to clear the nose either forward or backward. Our next effort was to find out

whether either inspiration or expiration helped to clear the sinuses. This was first demonstrated on patient L. G., who was very useful also in the later experiments. L. G. had a frontal and maxillary sinus involvement on the right side, of several years' duration. After the anterior tip of the right middle turbinate had been removed, the opening of the fronto-nasal duct and the hiatus semilunaris were clearly visible and could be differentiated from each other. Both



Fig. 1.

showed pus. This was wiped away and a nasal suction tip was put into the right nostril so that it fitted tightly; the left nostril was closed and the patient was told to close his mouth and inhale as strongly as possible. The condition then produced was the opposite of auto-Politzerization, and may be called auto-suction. The manometer showed a vacuum of 26 mm. of Hg. The nostrils were then freed and the sinus openings examined. A large amount of

pus had come from them. This procedure was repeated on half a dozen other patients with purulent sinus disease, and pus could be drawn from the sinuses by auto-suction, with manometer readings of 20-30 mm. Hg., negative pressure.



Fig. 2.

That auto-suction could draw pus not only downward from the frontal sinuses, but also uphill from the antrum, was also demonstrated on patient L. G. After his frontal sinuses had cleared up and ceased discharging, as shown by the fact that no pus issued on

aspirating or probing the frontal sinus, auto-suction still brought pus from the hiatus semilunaris.

The next step was to ascertain how the intra-sinus pressure varies with respiration. L. G. was again used for this purpose. A metal eustachian catheter, suitably curved, was introduced into his frontal sinus through the natural opening. We were certain we were in the frontal sinus because we had repeatedly introduced rubber drainage tubes into it, as illustrated by X-ray pictures (Fig. 1 and Fig. 2) after the method devised by us and published in the *American Journal of Surgery*, May, 1920. The catheter was then connected with a manometer, the mouth and both nostrils were closed, and the patient was told to blow hard. The manometer showed 6 mm. Hg., positive pressure. The patient was then told to inhale strongly, and the manometer showed 7 mm. Hg., negative pressure.

The low readings were probably due to the fronto-nasal opening being occluded by the tube or the upper end of the tube being in contact with mucous membrane.



Figure 3.

The pressure in the antrum was then investigated, as follows: A stiff probe, about 8 inches long, was curved at the end so that it could be hooked over the edge of the hiatus semilunaris. A soft rubber catheter, No. 8 F., about 7 inches long, with the tip removed, was then threaded on the probe so that one end came to the end of the curve, as shown in Fig. 3.

The two were then hooked over the edge of the hiatus, the probe was held firmly with one hand, and the catheter was pushed up with the other for about two inches. As the upper end of the catheter came off the curved end of the probe it was directed downward by the curve and entered the os maxillare. Two inches being enough to reach the floor of the antrum, the probe was lifted off the edge of the hiatus; the catheter was then held firmly, and with a little manipulation the probe was drawn down and out from the catheter, leaving the catheter with one end in the antrum, as proved by X-ray in Fig. 4. The manometer was then connected with the outer end of the catheter and auto-suction applied. The reading was 5 mm. Hg., negative pressure. On blowing, the reading was 3 mm. Hg., positive pressure. The low readings here also were probably due to occlusion of the tube at the antrum opening.

The variations of pressure in the sphenoid were investigated on another patient, L. C., as follows: A fine metal canula was inserted into the right sphenoid, the opening of which was distinctly visible. The lower end of the canula was then connected with the manometer. The reading on inspiration was 17 mm. Hg., negative pressure. On expiration the reading was 35 mm. Hg., both being the same



Fig. 4.

readings as were recorded when the nozzle of the manometer was held at the nostril.

The foregoing experiments have shown that suction can draw pus from the sinuses, and that in many cases this suction can be applied by the patient himself, using auto-suction. The sniffing that patients with nasal disease so often indulge in no doubt serves to relieve the sinuses in many cases. Auto-suction does not succeed



in getting pus in all cases, however. In a few cases where an enlarged turbinate filled the vault of the nose tightly, the pump had to be used; but never was a greater pull than 5 inches or 125 mm. Hg. needed to get pus when present.

The next step was to review and analyze the observations on the ordinary use of suction that we had made in the last few years. The suction pumps now on the market have vacuum gauges reading to 30 inches of mercury. They develop, however, between 3-22 pounds, depending on their construction. Moreover, it takes  $\frac{1}{4}$  to  $\frac{1}{2}$  a minute to reach the maximum reading, because the air in the tube and the suction bottle must be exhausted. It is the practice of those who use suction correctly to apply it intermittently, imitating the intermittent expulsive efforts of nature, as seen in the cough and the sneeze. While the patient is saying "kay-kay," the operator alternately applies and withdraws the suction tip from the nose, at intervals of a few seconds. The amount of suction actually produced, as shown on the gauge, is only  $\frac{1}{2}$  to 5 inches (12-125 mm. Hg.). This is considered by most men to be sufficient, and is therefore in accord with the observations made in our experiments.

Sometimes, through ignorance or inattention, the suction tip is held in the nostril for a sufficient length of time to permit the maximum suction to apply. The results are then as follows: The soft palate is drawn violently upward into the naso-pharynx, producing a very disagreeable sensation. The nasal mucous membrane is affected according to whether or not it has previously been shrunk by adrenalin or cocaine. If it has been shrunk down, there is very little effect; it seems to resist damage pretty well. If it has not been shrunk, it swells tremendously, and even begins to bleed; the swelling persists for a long time and is with difficulty reduced by adrenalin. It seems that the extreme suction produces a local paralysis of the blood vessels. In some cases the mucous membrane is more delicate and bleeds more easily than in others, just as some skins show bruises more easily than others. In some cases where a septum has been resected and has not become taut, high vacuum causes it to flap over against the side of the nose and close up the passage.

In the light of our studies, it seems that we can safely apply the following rules in the use of suction in disease of the nasal accessory sinuses:

1. The suction pump must be fitted with a vacuum gauge that is more sensitive than those now used.

2. The pump must be fitted with a by-pass valve, so that the vacuum can be regulated.
3. The vacuum necessary to draw pus from the sinuses must be ascertained first by using a gauge with auto-suction or the pump.
4. The by-pass valve must be set for that vacuum.
5. The vacuum must be applied intermittently at intervals of a few seconds.
6. The patient must be taught to use auto-suction, just as he is taught to use auto-Politzeration.

What can be said of the efficiency of suction in clearing the sinuses of pus? We have seen that auto-suction or gentle pump-suction can draw pus from the sinuses. Neither, however, can draw all the pus out, because the sinuses have rigid walls and the adhesiveness of pus causes it to stick to the walls. We have repeatedly washed pus from a sinus after it has been aspirated. They can, however, be made to get rid of some of it. In this connection, we feel that much help will be given by the development of auto-suction as a common therapeutic measure. Diseased sinuses secrete pus continuously. The physician can apply his pump only occasionally, perhaps once a day. The patient, however, can apply auto-suction many times during the day, and should be taught to do so. All he has to do is to close his mouth, hold both nostrils, and inhale strongly,—just the opposite of auto-Politzeration. Auto-suction has the further advantage in that it enables the patient to apply a gentle, passive hyperemia to the mucous membrane of the nasal cavities.

In conclusion, we wish to state that since we have done this work we have changed our opinion of the value of suction in sinus disease. We formerly rather derided it; we now feel that it has a distinct place in the treatment of sinus disease. It cannot, of course, take the place of necessary operative measures. It cannot even clear the sinuses completely of pus; but it can clear out some of the pus, and when used frequently at low pressure, like auto-suction, the total amount of pus evacuated is large and must be of benefit.

253 West 42d Street.

## ON THE ANATOMIC AND PATHOLOGIC STRUCTURE OF THE LARYNX.\*

DR. EMANUEL M. JOSEPHSON, New York.

In the course of examination of fresh and preserved specimens of the larynx, our attention was struck by a structure in the subglottic space, a description of which we were not able to find in the literature. The structure in question is a more or less pronounced swelling on the inner wall of the larynx, with a punctiform or slit-like central depression, somewhat below the level of the crico-arytenoid joint, close to the insertion of the true cord. It varied in prominence in the various specimens examined. In the larynges of children it could be made out fairly regularly, and assumed the appearance of a thickening in the mucous membrane at the point mentioned, in the center of which thickening or depression could be faintly made out. In the average adult larynx, the structure is more difficult to make out, because of the fact that the mucous membrane is less delicate than in the larynx of an infant. But, in about 20 per cent of the larynges examined there was found on one or both sides an exaggerated development of the structure in question.

This structure (Fig. 1) constitutes a swelling in the wall of the larynx, usually oval in shape, situated a little below the crico-arytenoid joint and the processus vocalis. It may best be described as consisting of two lips, an upper and a lower, bordering a central slit- or sinus-like depression. In the cases on which this paper is based, the average dimensions of the structure were 0.7 cm. X 0.5 cm. Superficially examined, this structure was usually diagnosed an ulcer by the pathologists. On a careful microscopic examination, there was found nothing to support the diagnosis, inasmuch as the overlying mucous membrane was intact and glistening and all signs of scarring were absent. In addition, the diagnosis was barred out by the frequency of the find in larynges which were otherwise absolutely normal.

Serial sections were made of several of the cases, and the picture found was a fairly constant one (Fig. 2). The depression observed in the center of the structure shows up in cross section as a fairly deep and large sinus (1), into the depths of which there mouths a duct (2), (in this case about 2 mm. in diameter draining an underlying group of glands (3). These glands lie between mucosa and the M. Vocalis, form the swellings constituting the lips of the struc-

ture, and extend downward into the wall of the subglottic space, and upward frequently into the true cords. The various islands into which this group is divided drain through secondary ducts into the large common duct (2). The glands constituting this group are of two types: one, resembling the ordinary mucous gland; the other,

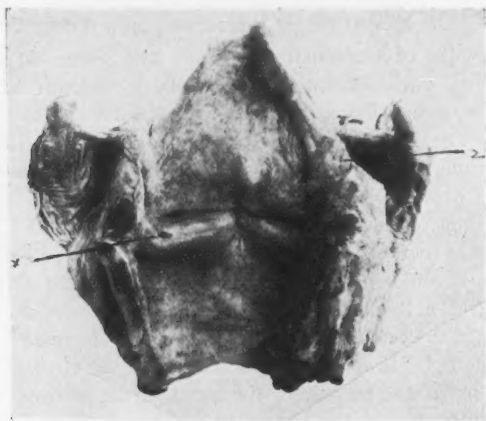


Fig. 1.

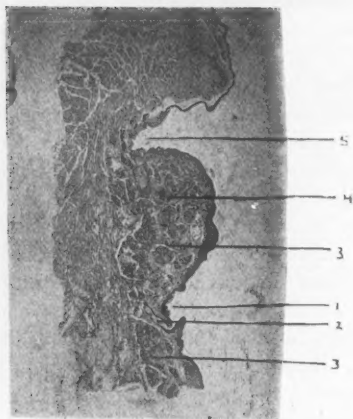


Fig. 2.

similar to the salivary glands, differing from them, however, in that they are of compound tubular structure (Fig. 3). Maziarski has noted this peculiarity of the laryngeal glands.\*

\*A. Prenant, P. Bonin et L. Maillard—Traite D'Histologie.

Although laryngeal glands located similarly to the structure herein defined have been described, it has not been recognized that this gland group may constitute a system of glands with a common excretory duct. What its function may be is open to question. It seems

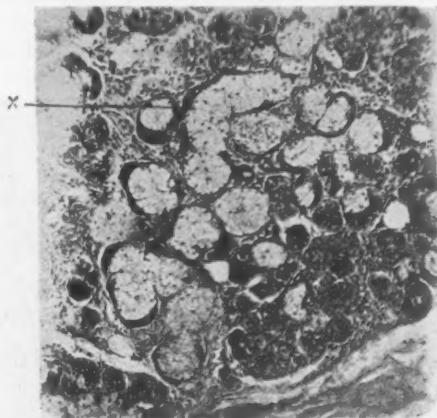


Fig. 3.



Fig. 4.

probable that the glands serve to moisten the subglottic space, and, indirectly, the under surface of the vocal cords at a point where the glottis is widest, where the volume of air current is the largest, and the danger of drying most marked. Its location between the

mucosa and the M. Vocalis probably results in a regulation of the secretion of the glands by the action of the muscles.

Pathologically the structure is of interest. Infection of these glands on one or both sides may occasion a laryngeal stenosis of marked degree. The writer has been called on to enucleate these glands in a case in which a primary, non-specific, acute infection continuing as a chronic process resulted in a high-grade, non-dilatable laryngeal stenosis (a case which represents a clinical entity

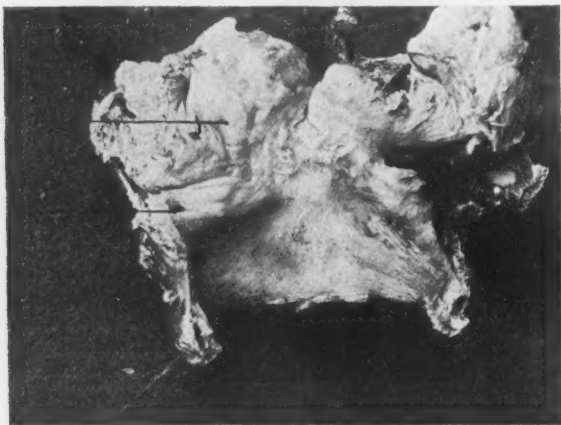


Fig. 5.

which has not been clearly described and defined, and will constitute the subject of a later communication). The peculiar lesions of pachydermia laryngis, named by the Germans "Hühneraugen-läsionen" (*pachydermia typica procesuum vocalis*) are pathological changes in the structure here described (Fig. 4 (1)). Subglottic polyps also frequently arise from the sinus of the structure (Fig. 4 (2)). Fig. 5 is a photograph of an extirpated carcinomatous larynx in which this structure was secondarily involved.

342 Madison Ave.

THE CONTROL OF THE PAIN OF HERPES ZOSTER OF  
THE NERVUS OPHTHALMICUS THROUGH THE  
NASAL (SPHENOPALATINE, MECKEL'S)  
GANGLION AND THROUGH THE  
SPHENOID SINUS.\*

DR. W. M. C. BRYAN, St. Louis.

The pain of herpes zoster is so severe that any means of alleviating even a subdivision of it will be most gratefully received by the sufferer and his physician. The fact that this relief can be obtained through the nasal ganglion is of much interest to those of us who have been following the work of Sluder\*\* in discovering the remarkable nervous connections of this ganglion.

On the evening of March 16, 1922, Dr. G. C. S. presented himself with the history of having noticed some hard lumps on his right temporal region the week previous. There had been pain confined to that region extending to the edge of the orbit. That afternoon the pain had involved the right eye, and lacrimation was excessive. The etiology was probably an acute grippal rhinitis of the prevailing type.

On examination I found some old herpetiform lesions in the temporal region, and some fresh blebs along the distribution of the supraorbital and frontal nerves. The conjunctiva was congested and the right eyelid could be opened only about halfway. Herpes zoster was suspected, but as the nasal condition was more evident, treatment was confined to the rhinitis with some relief.

The next day the pain was more severe and the patient was confined to bed. He complained most bitterly of the pain in the eyeball, which felt as if it would burst. The herpes had more definitely marked out the distribution of the nerves on the forehead and confirmed the diagnosis of herpes zoster of the Rami zygomatici temporales and zygomatici faciales of the second (maxillary) division of the fifth nerve and of the Rami supraorbitalis and frontalis of the first (ophthalmic) division of the fifth nerve. An effort was made to relieve the pain by cocainization of the nasal ganglion, with the happy result that the patient said, "The pain in my eye is wiped out and I can open it." There was still unrelieved pain in the distribution of the Supraorbital and Frontal nerves. In hope of reaching that also a successful attempt was made to introduce a cot-

\*Read in part before the St. Louis Medical Society, March, 1922.



ton tipped applicator wet with a saturated cocain solution through the sphenoidal ostium with prompt relief. The application was made to the middle of the lateral wall (approximate) of the sphenoidal cell. There was still pain in the distribution of the zygomatico-temporal and facial branches of the maxillary division of the fifth nerve and no effort to reach it succeeded. This treatment gave re-

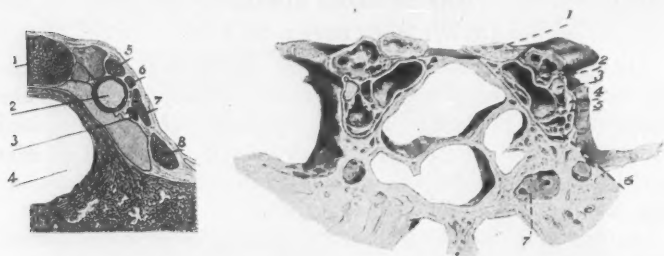


Fig. 54.—Cross transverse section of the cavernous sinus. 1. Hypophysis. 2. Internal carotid artery. 3. N. Abducens. 4. Sphenoidal cell. 5. N. oculomotorius. 6. N. trochlearis. 7. N. ophthalmicus. 8. N. maxillaris (after quain).

Fig. 55.—The usual cavernous sinus with large cross section and great length. Shows wide separation of all cranial nerves from body of sphenoid. 1. N. ophthalmicus. 2. N. trochlearis. 3. N. oculomotorius. 4. N. ophthalmicus. 5. N. abducens. 6. cavernous sinus. 7. Vidian canal.

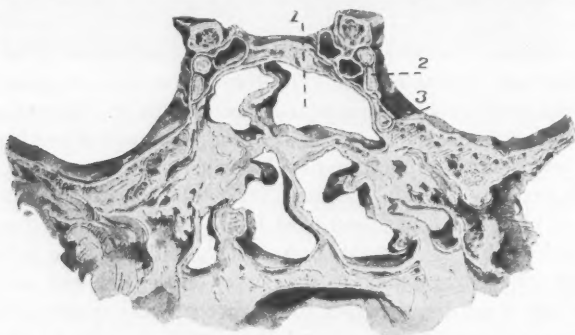


Fig. 65.—1. Right sphenoid cell. 2. N. ophthalmicus. 3. N. maxillaris.

lief which the patient characterized as wonderful. It was repeated on the two succeeding days, after which it was not needed. In attempting to explain the result it may be stated quite definitely that the ophthalmic division of the fifth nerve was reached by the cocain applied through the sphenoidal ostium.

The question was raised as to whether this application to the fifth nerve was not in itself enough to control the eye pain, but this could

not be answered until an opportunity for another observation was offered.

Unfortunately for the patient, there was a recurrence of the herpes with the pain on April 13. It was again necessary to resort to cocain and this time the first application was made through the sphenoidal ostium about to the middle of the lateral wall of the sphenoid cell which is approximately where the ophthalmic nerve passes. The applicator was left in place for fifteen minutes without affecting the pain in the eye, relieving as before, however, the pain in the distribution of the ophthalmic nerve. The eye pain was then promptly controlled by cocainization of the nasal ganglion.

The possibility of making this observation was due to the accidental relation of the ophthalmic division of the fifth nerve to the sphenoidal cavity in this case. Not infrequently the ophthalmic nerve is so placed that it is separated from the lateral wall of the sphenoid by so much tissue that it would be impossible to cocainize it from within the sphenoid. This condition is well illustrated by Fig. 54 and Fig. 55 in Sluder's "Headaches and Eye Diseases of Nasal Origin." A closer relation of this nerve is shown in Fig. 65 of Dr. Sluder's work. A further aid was a perforation in the septum which permitted the introduction of the applicator from the opposite nostril through the perforation and into the sphenoidal ostium obliquely toward the lateral wall. Frequently eye pains have been controlled by cocainizing the nasal ganglion by all the clinicians working in Dr. Sluder's clinic. This case differs in that the effective cocainizing of the ophthalmic nerve was proven by the relief of pain in its terminal branches, without effecting the eye pain.

The conclusion from this case is that in herpes zoster involving the superficial distribution of the ophthalmic division of the fifth and the zygomatico-temporal and facial branches of the maxillary division, there may be pain in the eye, distressing in character which cannot be controlled through the ophthalmic nerve and is readily controlled through or by means of cocainization of the nasal ganglion. This point is of additional interest because the sensory nerve supply of the orbit and globe is furnished by branches of the ophthalmic division of the fifth nerve, while the nasal ganglion is the sympathetic ganglion of the maxillary division, corresponding to the ciliary ganglion of the ophthalmic and the otic ganglion of the mandibular division.

\*\*Sluder: "Headaches and Eye Disorders of Nasal Origin," 1918. Mosby & Co., St. Louis.

**VARIX OF THE VOCAL CORD, A COMMONLY UNRECOGNIZED PATHOLOGICAL CONDITION, WITH HISTOLOGICAL STUDY IN SIXTEEN CASES.\***

DR. CALVIN B. FAUNCE, Boston.

Varix of the vocal cord, has hitherto been an almost unrecognized clinical and pathological condition. Were it not for the indelicacy of the term, "hemorrhoid", as applied to the larynx, it would seem that this expression could properly be used in the title of this paper, for hemorrhoid appears to be an apt pathologic term to describe a lesion of the vocal cord, which I am convinced occurs not infrequently, and which the pathologist perhaps content to exclude lesions of a grave or malignant nature, and doubtless not particularly interested in special pathology, has not taken the pains consistently to note or describe. The laryngologist, too, while he has without doubt observed these vascular tumors, evidently has not appreciated nor realized their character and if one may judge from literature has given little thought to this condition. A study of the records at the Massachusetts General Hospital would indicate he has confused clinically varices of the cord with other bleeding tumors.

My interest was first drawn to varix of the cord by Dr. F. H. Verhoeff, pathologist to the Massachusetts Eye and Ear Infirmary, who invited me to examine several sections of small tumors removed from the vocal cords, the first of which he observed in 1913 and very aptly termed hemorrhoid. In these sections one could hardly fail to be impressed by the fact that the numerous veins which composed the tumor were very much dilated and for the most part firmly thrombosed and in parts organized.

This cursory examination suggested the study of all pathological material taken from the vocal cords which was available at the Massachusetts General Hospital and the Massachusetts Eye and Ear Infirmary and this paper is based upon the study of this material and upon the more careful clinical and pathological examination of all benign cord tumors seen subsequently.

At the two hospitals mentioned there have been in a period of fifteen years, precisely 117 cases of benign cord tumors operated upon, and in this paper I include as benign tumors, only papilloma, polyp, angioma, fibroma and varix of the cord. Of these 117 cases

\*From the laboratory of the Massachusetts Eye and Ear Infirmary. Candidate's thesis for the American Triological Society, read by title.

16 proved to be varices. I have been able to examine clinically a considerable number of these patients and to go more deeply into their pre-operative and post-operative histories, giving special attention to patients who I discovered should pathologically fall within the diagnosis of hemorrhoids of the cords. One is especially impressed by the fact that cord tumors in our clinics have been very much more frequently operated upon, since the advent of direct laryngoscopy, the explanation being, of course, quite obvious; for example, from 1908 to 1913, five years, we had 18 operative cases of cord tumors; from 1913 to 1917, four years, there were 29 cases; from 1917 to date, four years, there were 56 cases.

Unfortunately the pre-operative histories in varix of the cord seem indefinite and of no practical assistance in arriving at a diagnosis. They are much the same as the histories in papilloma or polyp, thus "began with a cold" is most common, while following a definite infection such as influenza or pneumonia comes next. A weak right heart, disturbed or weakened circulation entered not at all as an etiological factor nor did pressure at a point distant seem to have any bearing. Of the patients that had had Wassermann tests all were negative and sedentary life was not found to be a factor.

As a matter of age incidence in cord varix, the youngest case was 16 years of age, the oldest one 47 years of age. The ages of the remaining 14 cases ranged from 22 to 44. Perhaps no age is exempt but the majority of the cases in this series occurred in middle life.

The preponderance in the number of males, who from exposure are more subject to laryngeal catarrh than the opposite sex, serves perhaps as confirmatory evidence of the infectious origin of varix, as only two cases in my series occurred in women.

Langmaid<sup>1</sup>, giving his opinion as to the cause of submucous hemorrhage of the vocal cords (this perhaps applies in varix) says, "in consequence of a laming of the vocal muscles from a catarrhal chondritis much greater force is required than is natural to bring the glottis into sounding position. This results in congestion even to the extent of rupture of a blood vessel."

I had thought voice strain was of etiological importance; however, there was a notable and lamentable absence of voice strain in the histories of the varix patients. Langmaid reported that Richard Mansfield, after playing "Dr. Jekyll and Mr. Hyde", at times suffered from hematoma of the cord. It is quite conceivable that what Dr. Langmaid took for a hematoma was in reality a varix. I had



Plate 1. A. Hyaline Fibrinous mural thrombi. B. Fresh (post-operative) blood. C. Hyaline fibrin with new formed capillaries.

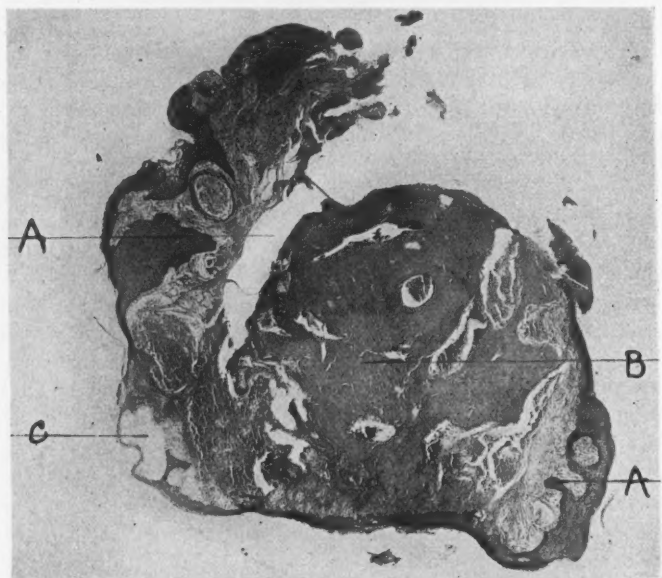


Plate 2. A. Surface epithelium dipping deeply into the stroma. B. Masses of hyaline fibrinous material. C. Dilated blood space with very thin epithelial covering.

fancied that in cord varix, as in rectal hemorrhoids, there was occasional loss of blood, but the histories did not bear this out.

It may be well to state here however, that some of the microscopic sections show but a very thin layer of epithelium covering the varix (plate 3), and it seems really remarkable that rupture does not occur, (and indeed it may).

Etiologically then varix of the cord would appear to be a matter of conjecture.

It is interesting to note that in these varix cases there had been a considerable variety of clinical diagnoses, such as papilloma, polyp, angioma, hematoma and tumor of the cord. Operative findings were in accord with these diagnoses and no one speaks of a condition simulating varix, indeed I am not certain that cord varix presents a typical clinical picture which would distinguish it from other tumors. I feel certain, however, that it is within the experience of all laryngologists to have operated on small vascular tumors of the cord which have mysteriously disappeared when disturbed with a remarkably small amount of material left for the pathologist.

I presume a typical case or at least one of easy diagnosis is that of Case 12 in my series. This patient, with the suspension apparatus, showed a small tumor on the anterior third of the left vocal cord. It was about 5 mm. long at its base and was nodular or pyramidal in shape. Its apex presented toward the opposite cord, thus preventing normal approximation. The tumor was everywhere dull white in color except at the base where a narrow bluish-red areola contrasted strongly with the white glistening cord beneath. This made a very pretty picture, giving a general impression of a small tumor resting on a vascular base. On section it proved to be a varix covered by a rather thick epithelium.

Beneath the epithelium the superficial portion of the tumor had undergone connective tissue changes, while that part in relation to the cord showed dilated blood spaces with the characteristic pathological picture of varix.

The clinical diagnoses made in the 16 cases of my series were: Papilloma, 9; Tumor of the cords, 2; Polyp, 1; Fibroma, 1; Angioma, 1; Diagnosis reserved, 2.

The fact that 9 out of the 16 cases were diagnosed as papilloma, leads me to believe that many varices have a non-vascular appearance.

The color of the tumor when in situ probably depends largely upon the thickness of its epithelial covering which is doubtless determined by the pressure of the blood within the varix, and by the

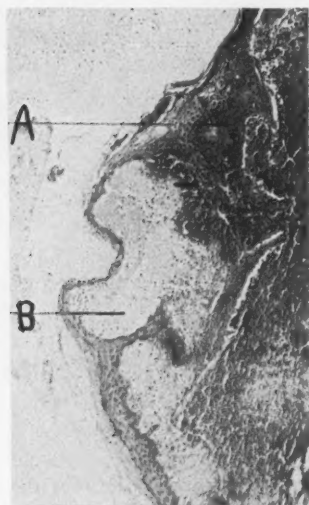


Plate 3. A. The irregular vein entirely occluded by hyaline thrombus. B. Extremely dilated blood spaces containing serum, blood cells and fibrinous strands.

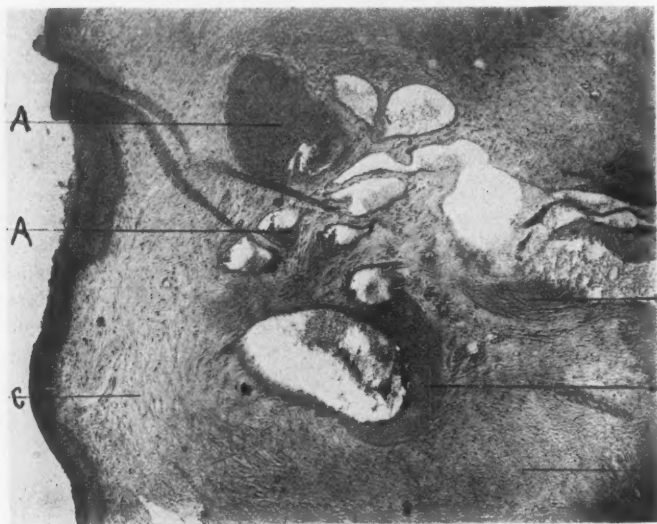


Plate 4. A. Mural thrombi of large and small veins. B. Hyaline fibrin in vessel walls. C. Fibroma like tumor masses.



friction and pressure of the opposing surface. The color must also depend upon the amount of new connective tissue intervening between the surface of the tumor and existing vessels.

There was little tendency to recurrence of the varix after operation, in the cases in this series; the longest standing case is seven years, the shortest only two months.

The operative procedures consisted in the removal of the "tumor" and there was no unusual bleeding except in one case.

Critical search of the literature from 1880 to date reveals but two reported cases of varix. Chiari<sup>2</sup>, made serial sections of two tumors that had been removed from the vocal cord in which he was able to follow dilated veins throughout the sections and concluded that these were cases of true varix. H. Billwroth in discussing his paper maintained that the tumors nevertheless were angiomata. Wingrave<sup>3</sup>, in his paper on "The Pathology of Fifty Innocent Laryngeal Growths", referring to the character of mesoblastic or connective tissue tumors, states that these highly vascular growths are strongly suggestive of hemorrhoid, since there is not only attenuation of the walls of the veins but an overgrowth of the vessels themselves; yet he gives hemorrhoids no classification in his series. Philips and Rub<sup>4</sup>, in speaking of cord tumors say that, "not infrequently vascular papillomata, fibromata and especially *varices* are erroneously called angiomata," thus only *referring* to varices.

In my sections I have demonstrated the possibility of change in character of the varix to that of a true fibroma (plate 4). According to Knight and Bryant<sup>5</sup>, "a fibroma may grow more vascular and finally appear as a genuine angioma." Angioma and lymphangioma occupy a conspicuous place in the literature (6, 7, 8) with excellent clinical and pathological descriptions and in some instances with very good plates. Many cases of hematoma of the cord are reported and have been well and fully described. It seems reasonable to believe that some of the reported cases called "hematoma," "blood tumor," and "angioma," when not supported by laboratory diagnosis may have been varices. G. Coupard<sup>6</sup>, reports a case of "blood tumor" of the left vocal cord with a small transverse vessel terminating in it. The tumor was situated on the free border of the cord, and prevented normal phonation. He regarded this case clinically as one of hematoma yet with this very suggestive description, the case could very well have been one of varix.

Sir F. Semon<sup>7</sup>, on the other hand reports a somewhat similar case in a patient who had been hoarse for six months. Pathological ex-

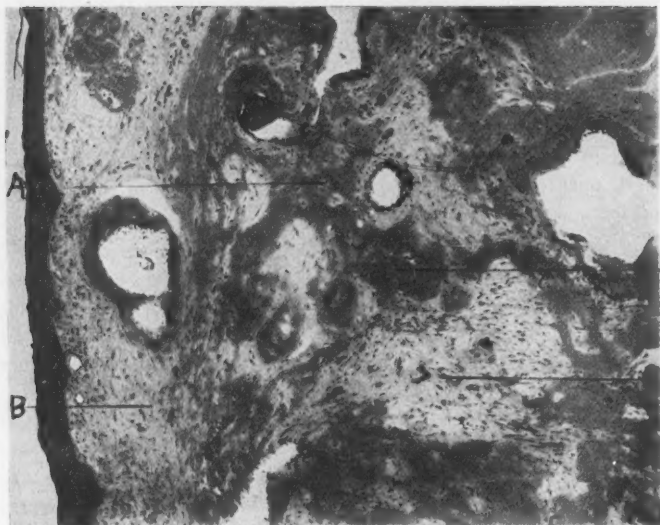


Plate 5. A. Hyaline being split up by connective tissues. B. Fully formed connective tissue.

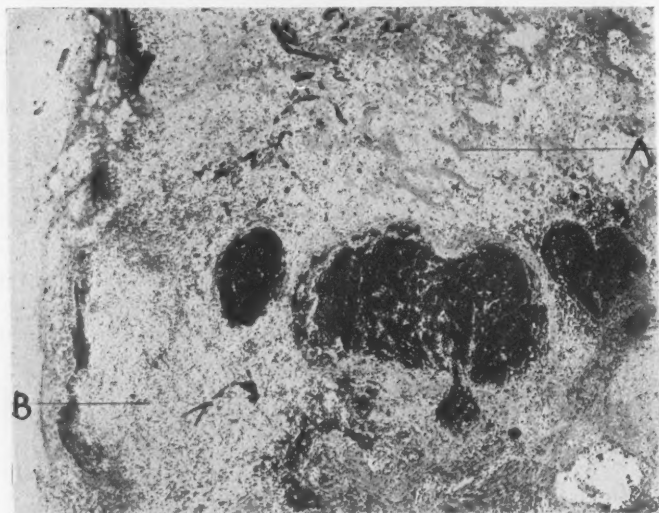


Plate 6.

amination in this case however definitely proved that the tumor was a true organizing blood clot.

Ewing<sup>8</sup>, says that many of these small tumors (angiomata) consist of simple varices, capillary or venous, and are not neoplastic; and that others reach a considerable size and show a definite overgrowth of new vessels.

Glasgow and Bremer<sup>9</sup>, Grant<sup>10</sup>, and others have reported cases of vascular tumors of the cord but do not mention or describe varices.

Pistre<sup>11</sup>, wonders whether a vascular tumor is caused by catarrh or whether the catarrh is caused by the tumor.

The micro-photographs and descriptions here submitted, are offered with the hope that they may serve to give the reader more exact and comprehensive information regarding the pathology of varix.

The sections photographed were selected from my series as being most typical of the various stages through which cord varix passes.

The formation of hyalin fibrin mentioned in the description of these sections is a most characteristic feature of varix. There can be no question as to the identity of this tissue as fibrinous strands can be directly traced into the older more homogeneous hyaline, and moreover, Weigert's differential stain for fibrin, Mallory's Phospho-Tungstic hematoxylin and the Gram stains, were employed for further differentiation of the fibrin.

All of the sections unless otherwise stated, are stained with hematoxylin and eosin.

#### DESCRIPTION OF PLATE I.

This is a vertical section of a varix near the middle of the tumor. The epithelium covering of the tumor is of fairly uniform thickness. The superficial portion of the tumor shows numerous dilated veins and blood spaces. The stroma here shows relatively slight departure from the normal, except that it is edematous and infiltrated with hyaline fibrin. Hyaline fibrin is also seen within the walls of the veins and in the net work of the stroma. Some of the vessels contain fresh blood and most of the blood spaces show an endothelial lining. Certain areas near the surface show moderate tissue inflammation as characterized by the leucocytic infiltration. The deeper portion of the tumor has been replaced by hyalin fibrinous material which is being invaded and split up by connective tissue cells. Considerable fibrous tissue has already formed in this area, in which young capillaries containing fresh blood can be identified. There is evidence of beginning organization throughout the whole tumor.

There are not sufficient new formed vessels to make this tumor consistent with that of angioma.

DESCRIPTION OF PLATE 2.

This is a vertical section near the middle of the tumor. The main portion of the tumor is nearly divided from the remaining portion by a large artifact. The epithelium covering the tumor varies greatly in thickness. The upper left border of the section shows the epithelium dipping deeply into the stroma forming papillae and is suggestive of a beginning papilloma. There is considerable surface inflammation of the tissue in this area. At the lower left corner of the section and immediately beneath the very thin layer of surface epithelium is a large distended blood space, containing serum, blood cells, and fibrin strands.

The structure of the main portion of the tumor, is almost entirely replaced by masses of homogeneous hyaline fibrin in which are a few vessels. This area show but little tendency to connective tissue overgrowth.

DESCRIPTION OF PLATE 3.

This is a higher magnification of a field taken from plate 2. It shows the markedly dilated and distended blood space containing serum, blood cells, and fibrin strands, already referred to. Note the thinness of the surface epithelium covering the space; the dipping in the center is probably due to an artifact.

Immediately above this area is an irregular shaped vein whose lumen is entirely occluded by a hyaline fibrin thrombus.

DESCRIPTION OF PLATE 4.

This is also a vertical section of a varix at above the middle of the tumor. It appears almost as a fibroma and yet the area in the center of the section presents a picture similar to the ones found in my other sections, notably the characteristic hyalin fibrin in the walls of the vessels and the mural and occluding hyalin fibrin thrombi in the veins. The distended blood spaces are in part filled with blood and are more centrally placed in the tumor than those shown in the other sections. Note the amount of fibrous tissue intervening between the blood spaces in the center of the section, and the surface epithelium.

DESCRIPTION OF PLATE 5.

This is also a vertical section at about the middle of the tumor. There is nothing remarkable about the surface epithelium. The section shows the characteristic hyaline fibrin masses being invaded and split up by connective tissue. The hyaline in the walls of the widely dilated veins, is here also very conspicuous. Note the scarcity of small vessels such as is seen in angioma.

## DESCRIPTION OF PLATE 6.

The central portion of this section shows a number of widely dilated and engorged veins, filled with blood. The hyalin fibrin does not show well in the photograph but can be seen in the upper portion of the section. There is a marked general leucocytic infiltration of the tissue due to infection.

The following is a brief summary of the various pathologic steps, which may be definitely traced through the sections:

1. Engorgement and dilation of the veins in a localized area causing the primary tumefaction of the vocal cord.
2. The early thrombosis of these veins characterized by the formation of hyaline fibrinous material within the vein and in their walls, by large fibrinous deposits in the stroma about the veins, and the deposition of more or less blood pigment in the tissues.
3. The invasion of the fibrin masses by fibroblasts with the resulting formation of new hyaline fibrous connective tissue in which newly formed capillaries are seen.
4. Occasional leucocytic infiltration of the superficial portion of the tumor, evidently due to slight infection.

## CONCLUSIONS:

1. Varix of the vocal cord is a localized venous tumor characterized by engorgement and dilation of the veins and by deposition of large amounts of hyaline fibrin within these vessels and in the surrounding tissue.
2. The etiology of varix of the cord is obscure. It may follow infection and voice strain.
3. Cord varix may or may not present a typical or suggestive clinical picture; the differential diagnosis can often be made by the pathologist alone.
4. Varix of the vocal cord is not uncommon; it has been clinically unrecognized and its characteristic histological features have not hitherto been described.
5. Small varices are probably, sometimes completely absorbed, though absorption must necessarily be slow on account of the extreme fibrosis of the tumor. Larger varices may organize leaving a nodular base.
6. In some cases, it is probable that the character of the tumor changes into a fibroma or even papilloma.
7. In view of the fact that in this series, examination or report of patients in whom this condition was found pathologically, showed such little tendency to recur after operation, the prognosis in varix seems good.
8. Excision of the varix seems effective in its cure.

9. Varix of the cord is of clinical and pathological importance and should have a place in our nomenclature.

In closing this paper I wish to acknowledge my debt and gratitude to Dr. Harris P. Mosher, Chief of the Laryngological Service at the Massachusetts General Hospital for the use of his private and hospital cases; to Drs. Eugene A. Crockett and Frederick L. Jack, Chiefs of the Otological Service, at the Massachusetts Eye and Ear Infirmary for the use of hospital cases; and to Dr. Frederick Verhoeff, Pathologist to the Eye and Ear Infirmary, for the use of pathological material and his ready and helpful advice.

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320 Commonwealth Ave.

### AN UNUSUAL CASE OF MASTOIDITIS.

DR. THOS. E. HUGHES, Richmond, Va.

*Patient:* R. C. W., Jr., a school boy, thirteen years old, somewhat frail looking, was seen first during present illness September 7, 1922.

Complaint—Swelling behind right ear.

F. H.—Unimportant. No tuberculosis; no syphilis; no ear trouble.

P. H.—No illness except similar swelling over same mastoid in February, 1921. At this time several members of the family had influenza, which, however, this patient escaped. He developed slight pain in the right ear, and several days later a swelling appeared over the mastoid. The patient thinks there was a slight discharge from the canal, but not enough for irrigation. There was no acute pain in the ear nor in the mastoid. Swelling lasted for

several weeks, but gradually subsided without operation. As I did not see the patient during this attack, I cannot give you the condition of the ear drum, but Dr. Talley's history and X-ray findings of the case are as follows:

"February 15, 1921, patient has had some swelling over the mastoid region for the past week, which has gradually increased, has slight pain, very little tenderness on pressure. No discharge from the ear. Had some temperature, as high as 103° F. Left mastoid of pneumatic type, development fairly good for patient of this age. Right mastoid shows evidence of cell destruction in lower portion with general decrease in density."

Conclusion: The findings indicate a considerable amount of disease in the right mastoid.

X-ray report No. 2, February 21, 1921, shows:

"No evidence of any increase in the changes reported in the right mastoid are observed at this time. The X-ray appearance is essentially the same as before."

Conclusions: "The findings indicate that no increase in the process has taken place. A subsiding process would not necessarily give an alteration in the appearance of the plates. Therefore, it is perfectly possible that the condition may be improving."

Patient has been quite well since this attack, except when tonsils and adenoids were removed, July, 1921.

P. I.—Patient was seen September 7, 1922, and said that swelling behind the ear was first noticed the night before. There had been slight discomfort behind the ear for several weeks, but not sufficient to make him complain of it to his family. No pain in the ear, and no discharge at any time from the middle ear. No furunculosis, no infection in the nose, throat nor sinuses.

Examination revealed swelling over the mastoid tip, which extended slightly behind and below; some tenderness over tip, but none over mastoid antrum; no swelling about the auricle nor in the external auditory canal. The membrana tympani was normal in appearance except for very slight injection in Shrapnell's membrane. No bulging; light reflex present. The appearance of the drum did not change during the course of the disease. The hearing was only slightly impaired. Weber lateralized to the right. The patient was seen daily and swelling gradually increased until operation on the 13th. Temperature ranged from 98 4/5° F. to 100 3/5° F. No pain at any time, and patient felt well. Dr. Budd's report shows blood culture negative polynuclear 60 per cent; lymphocytes 37 1/2; eosinophiles 1 per cent, and basophiles 2 per cent.



X-ray report No. 3, September 11, 1922, shows: "Left mastoid pneumatic in type. Mastoid has normal appearance. Right mastoid shows sclerosis in anterior portion. This sclerosis is greater than observed at previous examination (see reports of previous examination). As reported previously, there is little or no cell formation throughout the whole bone, the cells which are present having a thickened and clouded appearance. There is a certain amount of rarefaction at the tip.

"Conclusions: The findings indicate that the old disease in the mastoid has undergone certain sclerotic changes, but this sclerosis is not complete, and it is thought from the appearance of the plates that active changes are present."

Operative findings: Abscess cavity (subperiosteal) over and behind mastoid tip, containing several drams of pus, from which culture showed staphylococcus aureus. A large fistula extending through the digastric groove into the mastoid tip, which was completely hulled out by necrosis of cellular structure. In the upper portion of the mastoid, the cells had been replaced by sclerosed bone, by which the pus in the tip was walled off from a practically normal antrum. The lateral sinus plate was necrosed from just above the bulb upward toward the knee for one-half to three-fourths of an inch. Sinus was apparently healthy. Patient had an uneventful recovery, and the wound was healed in about three weeks.

#### SUMMARY AND CONCLUSIONS.

1. The patient probably had a mastoiditis a year and a half ago, though with considerable doubt as to whether or not there was involvement of the middle ear.

2. During present illness a mastoiditis due to a staphylococcus aureus with much pus and considerable cell destruction in the tip and with practically no pain and without involvement of the tympanum.

3. Bony sclerosis between antrum and the infected area.

4. Blood culture negative.

The question naturally arises whether we are dealing with an idiopathic, or primary mastoiditis, or a latent condition that has existed for a year and a half without giving signs or symptoms.

I think we are dealing with a low grade, quiescent, rather than a primary infection, in view of the fact that we have a negative blood culture and no evident source of infection necessary for a metastatic process. And, furthermore, the absence of infection in the mastoid antrum and tympanum might be explained by the fact that the sclerosis, produced by the inflammation a year and a half ago, prevented the extension of the infection upward into the antrum.

## BOOK REVIEWS.

**"Endoscopie (Bronchoscopie, Laryngoscopie, Oesophagoscopie) et Chirurgie du Larynx."** Par Le Dr. Chevalier Jackson (F.A.C.S.), Ouvrage Traduit sur l'édition Américaine Originale par le Dr. Menier (de Decazeville). Paris, Librairie Octave Doin, Gaston Doin, Editeur, 8, Place de l'Odeon, 8, 1923. Tous droits reserves.

Reference to this treatise should be regarded rather in the nature of an honorable mention than as a review. It is truly a mark of distinction that an exhaustive treatise in a special field of medicine by an American author has received such recognition by European colleagues as to necessitate a foreign edition translated into French.

An added attest of the exceptional merit of this work is in the co-operation of the distinguished French colleagues who made possible the production of the French edition.

We regret to record that Dr. Menier, the French translator of Jackson's work, died before the completed publication of the volume and to Dr. C. Chauveau was entrusted the editorial completion of this publication.

We congratulate Dr. Jackson on this successful issue and feel gratified in the fact that the new French edition of his treatise will materially help to spread the scientific gospel of which he has been such an able advocate.

We feel an additional pride in the appearance of this French edition as it was the privilege of THE LARYNGOSCOPE to be the publisher of Dr. Jackson's original edition of his work on Endoscopy and Surgery of the Larynx.

**Tonsillectomy by Means of the Alveolar Eminence of the Mandible and a Guillotine with a Review of the Collateral Issues.** Dr. Greenfield Sluder, with Ninety Illustrations. C. V. Mosby Company, St. Louis, 1923.

In 1910, Dr. Sluder first presented his method of tonsillectomy, by means of the guillotine and the alveolar eminence of the mandible. Since that time this procedure has gained in popularity among laryngologists until today the Sluder operation or some modification of it is performed all over the world. Unfortunately, however, in his first exposition of the technique, Dr. Sluder made it seem much easier than it really is and no doubt much of the adverse criticism of the operation has been based upon results obtained by operators who did not follow the technique as detailed by Dr. Sluder. The mere fact that a doctor possesses a guillotine and a gas machine does not in any way make him a safe tonsillectomist.

In this book a very detailed account of the "Sluder Method" is given with a careful description of the anatomy of the jaw, upon a knowledge of which the operation depends largely for its success. The plates accompanying this chapter are especially good in that they show each step of the operation separately and illustrate some of the mistakes that may occur.

A separate chapter is devoted to a discussion of the physiology and pathology of the tonsils in which each of the theories of tonsillar function are taken up and disposed of separately. The various pathological conditions of the tonsil are then well described with very good drawings and sections from actual cases.

The last chapter is devoted to a discussion of the method of adenoidectomy by means of the Kelly direct vision adenotome.

This is a valuable book and is a dignified exposition of the fact that a tonsillectomy is not a minor operation or a trick, but a surgical procedure that should be performed only by a specially trained man in the same surgical environment as cutting operations on other parts of the body.

## THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

(Continued from page 656, August, 1923.)

### Depressed Nasal Deformity Due to the Submucous Operation. Dr. W. W. Carter.

The patient is a boy, 18 years of age who had a submucous operation performed at a special hospital four years ago. A short time after the operation, though there was no infection at the time, the bridge of the nose fell in, and at the time that Dr. Carter first saw him he had a well-developed saddle-back deformity, as shown by the photographs presented. Examination showed that the deformity had been caused by faulty technique in doing the submucous operation, the upper edge of the septum, the keystone of the nasal arch, having been removed.

Dr. Carter exhibited the patient and demonstrated that the deformity had been completely corrected and the function of the nose restored by means of his original rib-transplantation operation. The transplant in these cases is introduced from within the nose and no scar results. The upper end of the transplant is connected with the frontal bone.

The subsequent histories of a large number of cases operated upon by Dr. Carter show that the results secured are permanent and that the transplant is not absorbed, but that it lives and grows, its growth being regulated by the functional demands of the part. In no case has over-growth occurred.

#### DISCUSSION.

DR. HARRIS wished to congratulate Dr. Carter on the excellent result in his case. He had not heard of a case where sinusitis developed on the side opposite the injury and in the way explained. Incidentally Dr. Harris wished to ask if Dr. Carter regarded the closing off of the naso-frontal bone as a favorable result. This is generally regarded as an unfavorable result following most of the frontal sinus operations. In other words, it is the severe criticisms of many of the Killian results. There is a wide-open naso-frontal canal which gradually closes and blocks up bacteria which sooner or later becomes active, and then re-infection of the sinus takes place.

DR. FORBES recalled the fact that during his service on the other side during the war, he saw a shrapnel wound of the left frontal and although no X-ray pictures were taken, he thought the opposite frontal sinus was involved as opening could be felt by probe connecting with it. In view of the fact that there were no pictures and of the possibility of infection occurring, the right frontal sinus was opened and a piece of shrapnel was found there with a depression of the brain plate. If the case had been left without treatment a frontal abscess might have developed. That is the only case of frontal sinusitis caused by trauma that Dr. Forbes has ever seen.

DR. CARTER said that in regard to there being air in the sinuses, this was the result he had hoped to accomplish, for as he had previously mentioned, he did not do a radical sinus operation with the object of obliterating the sinuses. He only turned out the disintegrating blood clots after removal of a portion of the anterior wall of the sinus. The subsequent closure of the naso-frontal duct was not, of course, mentioned as one of the favorable features in the outcome of the case, quite the contrary; this was incidental but it had not proved to be a menace, as drainage from both of the sinuses apparently was taking place through the right normal naso-frontal duct.

As the left naso-frontal duct was completely obliterated by the original injury, he thought it best to open up this duct with the rasp in as the patient is well.

unable to say, but apparently this is a matter of no practical importance, order to get drainage, even though this should prove to be only temporary. As to whether or not the duct is now closed Dr. Carter was unable to say, but apparently this is a matter of no practical importance, as the patient is well.

The most important features in connection with this case are, its interesting etiology, and the unusual but fortunate course which the pus took in seeking its outlet, namely, through the septum and the thick anterior wall of the sinus rather than in the direction of the brain box.

DR. FORBES said that he did not know when he had seen a nose which looked so well as Dr. Carter's case of bone transplant. Dr. Forbes wanted to ask if he was using the tibia or the rib for the graft.

DR. CARTER in closing said that he had had quite a number of these deformities following submucous operations, and that a good deal of care should be exercised in doing that operation.

**Adamantioma of the Jaw. (Three Cases.) Dr. Henry Sage Dunning.**

DISCUSSION.

DR. ARTHUR P. STOUT explained that these adamantionmas are tumors which are supposed to arise from the epithelium which is left over when the teeth are formed. Apparently in all people a certain amount of epithelium is left. Fortunately in very few instances does it proliferate. When it does grow it occurs in the form of the reproduction of the embryonic enamel organ. Sometimes it forms dentine and tooth enamel, but usually the enamel stays fluid and forms cysts. Also occasionally adult teeth occur in connection with these tumors. Dr. Stout referred to the case presented by Dr. Dunning of the elderly woman with a growth of the superior maxilla who had an adult tooth in her jaw. These tumors are characterized by very slow growth, by the destruction of bone and by their cyst formation. Usually the cysts are multilocular, occasionally unilocular. These cases all proceed very slowly. Occasionally they may terminate fatally. Dr. Stout has seen the sections of two cases which so terminated. One was an individual who had had a large portion of his mandible resected, twenty years after which the tumor recurred near the temporo-maxillary articulation and resulted fatally. The other was a case in an elderly woman of an adamantinoma, occurring in the superior maxilla which had been removed by Dr. Blake in 1910. One year later she came to the Hospital with a recurrence in the submaxillary region. Section was made of that and showed the same type of growth, which was thought to be inoperable. At that time the Follow-Up System had not been instituted in the Presbyterian Hospital so it is not known what became of her, but Dr. Stout felt sure that she terminated fatally.

DR. J. D. WHITHAM said that about a year ago he had a case of adamantinoma of the inferior maxilla, which was at first mistaken for a sarcoma. A little section was taken out for diagnosis, and was shown to two well known pathologists. One made a diagnosis of carcinoma, so the case was thought to be inoperable. The section was taken to the second pathologist who pronounced it sarcoma. This last man's advice was taken and an operation done. Because of the probability of malignancy half of the lower jaw was removed. The growth was the size of a tangerine. Before the jaw was removed the external carotid was ligated, which gave an almost bloodless operation. The operation was extremely simple and easily done. Resection of half of the lower jaw is one of the easiest operations in and about the head when preceded by carotid ligation. The case turned out very favorably with little shock, and has healed up well. These tumors arising as they do from epithelial cells may be wrongly diagnosed by the pathologist. With a tumor like this, one should go to a pathologist who understands just what an adamantinoma is, because the cells resemble a carcinoma to a person inexperienced in pathology.

DR. COFFIN said Dr. Dunning spoke of one of the cases as having been curetted, and he would like to know when the curetting was done. The specimen presented looks like a completely closed cyst. It did not run as though the curetting could have been done within the cavity. Dr. Dunning spoke of these tumors as being multilocular. The pathologist says they may be monolocular. Dr. Coffin said he would like this point cleared up. He had had but one such case which was a large monolocular cyst of lower jaw. He stripped the bone of periosteum on both sides, cut down the bony sides of the cyst and curetted the bone at the bottom. The man made a satisfactory recovery and has had no trouble since, now about ten years.

DR. LEON T. LEWALD stated that what Dr. Coffin said is true also from the X-ray standpoint. It is not at all easy to make a differential diagnosis between these types of tumors. Dr. LeWald recalled a case of adamantinoma and a dentigerous cyst which had only one tooth in the distal portion. The way that a true sarcoma is distinguished is by the fact that it does break through the capsule earlier and spreads out, carrying with it some bony spicules into the soft tissue. Even that however may be absent in sarcoma. Dr. LeWald stated that once or twice especially in Paget's Disease he had been able to prevent a severe operation where he felt that the growth was a benign cyst where others thought it to be of a malignant character. He had asked to have a microscopical examination made of a section before half of the jaw was resected. That he thinks is a justifiable procedure without any danger of spreading the condition.

DR. DUNNING replied to the first question that the young lady had the mandible resected and had the artificial denture on the left side. He said that he could not tell exactly where the curettings were from, but curettage was done twice, both times under a general anesthetic. It was curetted right down just as thoroughly as possible to remove the growth. The curettage went right through the wall of the cyst to the body of the bone.

**Carcinoma of the Larynx. (Three Cases.) Dr. Saul Knopf.**

Dr. Saul Knopf presented Dr. Imperatori's cases. He said that he was showing the first case to demonstrate the apparently good result that can be obtained with radium. It is hoped that this patient will be cured. A little over a year ago he complained of some hoarseness which continued eight weeks before admission to Dr. Smith's clinic. The hoarseness increased, with a moderate amount of dyspnoea, although he did not have complete aphonia. He was admitted on June 20 to Dr. Smith's clinic. He is 75 years of age, and his previous and personal history are negative. At the time he was very anemic and pale in appearance, and looked very bad. He weighed 118 pounds. On examination of the larynx he presented a large polypoid mass the size of a pigeon's egg, lying upon the larynx above the vocal cords, apparently springing from a pedicle from the left vocal cord anteriorly. There was a moderate amount of space between the cord, so that he had sufficient breathing capacity. The general appearance of the larynx was congested, and both of the cords were congested. They did not approximate properly. Dr. Monroe suggested he come into the hospital for operation. However, he wished to go home and come back the following day. He did not come in then, but came the day afterwards, saying that he had had a violent fit of coughing and had expelled a large mass, which he brought with him. This mass was sent to the pathologist for examination. It was found to be merely a polypoid mass with loose connective tissue containing fibrous and hemorrhagic spaces with a moderate number of blood vessels between the stroma. On examination of the patient after the expulsion of this large mass, Dr. Monroe found he had a large area of tumefaction on the left cord, extending 2.5 to 3 cm. beyond the edge of the cord, with serrated edges. The question came up as to what the treatment should be. Of course thyrotomy was considered as the most

likely procedure. Owing to the fact that the patient looked very pale and anemic and considering his age, Dr. Monroe suggested that he be sent to the Bronchoscopic Clinic for radium application to see what the result of that would be, and then later do the thyrotomy. Under local anesthesia with an ordinary laryngoscope three needles were inserted directly into the mass with a long forceps. Pictures will be shown, and Dr. Robinson will describe his method and the amount of dosage and the frequency and extent of time that the needles were inserted. A few days following the initial application of radium the patient's color began to improve, and his general condition following radium is now markedly improved. He weighs 133 pounds. The interest is particularly in view of the fact that he has had such a general improvement, besides the local improvement. He had two other applications of radium in the Clinic externally. A section was taken by Dr. Monroe just previous to the application of radium, and the report was that the mass showed fine strands of mucosa, necrotic and irregular in areas, and in one area there were masses of epithelial cells surrounded by an edematous stroma infiltrated with polynuclear cells. Scattered thickly throughout the stroma are large spindle cells and round cells with a few giant cells. The diagnosis was basal cell epithelioma with edematous polypi.

(The second case was read by Dr. Jones.)

#### DISCUSSION.

Dr. SMITH said that perhaps Dr. Knopf would modify his statement in regard to his belief that the case was cured. He thought it would deserve modification, but if it is unquestionably a case of basal cell carcinoma of the larynx, which bear a striking parallelism to adenocarcinoma of the pharynx, the least malignant type, it may yield to radium. The microscope of course cannot determine anything in regard to the degree of virulence, but one year is entirely too short a time to formulate a definite opinion in regard to the outcome of a case. Up to the present this case has certainly shown marked improvement.

Dr. D. BRYSON DELAVAN said that anything helpful in these cases of carcinoma of the larynx is certainly most welcome. Last year he had referred to nine cases of carcinoma of the larynx which had been treated with radium at the Memorial Hospital, seven cases of squamous cell carcinoma, and two of granuloma. Those cases were seen about fifteen months ago by a number of prominent observers. After the treatment had been completed improvement had taken place. Of those who examined the cases there was only one who did not feel that the work had been successful. This observer admitted that three had shown marked improvement, but he was very sure that was not the case with the remaining number. Now at the end of fifteen months from that time not one of them has shown any sign whatever of recurrence. All are in excellent condition, even the ones that were supposed to show recurrence. The speaker urged that the word "cure" should not be applied in these cases. The more one sees of carcinoma, the more conservative he becomes to the prognosis. Everyone knows that some cases which have seemed cured for a number of years have ultimately succumbed to the disease. But as far as these cases to which Dr. Delavan referred, and to others which he has heard have been treated with radium, are concerned, no recurrence having taken place, at least it may safely be said that they are in abeyance. One cannot be more conservative in expressing an opinion than that. If after the lapse of years it can be proved that carcinoma has been cured, then a great advance in medicine will have been made. That may seem a very obvious remark, but the speaker thought it was justified because there has been so much skepticism and actual opposition in regard to the radium treatment of these cases. Even if one does not approve of the use of radiology, judgment should be suspended until it has been shown that the method is useless. All other methods of treatment have been under discussion for many years; the discussion has gone on in circles and the questions are still nowhere near solution, the advocates of the different methods still holding out



against one another. If any actual progress is to be made the subject must be approached with a receptive mind, all methods duly considered and tested and final comparison made between them when sufficient reliable data has been secured. At present the treatment by radium and by X-ray, although still in its infancy, seems to afford signs of decided encouragement. By no means therefore should the efforts of those who are trying so earnestly to develop its possibilities and extend its usefulness be discouraged. Certainly not, unless some remedy now unknown should be found.

DR. E. L. MEIERHOF said that those who have experience with these cases should report them, so that it will be possible to arrive at some conclusion as to the possibilities of radium treatment of these cases. Mr. D., 69 years of age, had been suffering for several months from difficulty in swallowing and also in his speech. Upon the first examination the explanation for his throat disturbance was very easily made. The left side of the larynx was infiltrated from the middle of the left ventricular band to the anterior commissure. The true cord was hardly to be seen. On account of the slowly developing process and the man's age there was no question what the disease was. There seemed to be an absence of glandular involvement. The patient went to Dr. MacKenty. He also pronounced it a case of malignancy and advised that the larynx be removed as soon as possible. The patient did not know what his trouble was and his family were opposed to immediate operation. He went from one laryngologist to another, and if he missed one, it was because he did not hear of him. Dr. Meierhof suggested the application of radium and referred the patient to Dr. Quick for treatment. Dr. Quick applied the radium to the mass, and he returned after a week or so and suffered very much as to the results of this application. There was less motility of the cords, and the aperture of the larynx was somewhat contracted. In the course of a few weeks the swelling receded, and he returned to Dr. Quick. This was two or three months after the first application, and Dr. Quick advised another radium application. After this he suffered tortures; he could not sleep; he had difficulty in swallowing, and he was in a very deplorable state. This continued for some little while, and gradually the swelling receded. In the meantime the patient had seen Dr. MacKenty the second time, and he insisted on operation. The family were not willing to give their consent to the operation, because within a few months he was to celebrate his golden wedding, and he was an extremely nervous individual, so they thought if he were operated on he would die. At the present time the entire infiltration has practically disappeared. There is a small granuloma midway beneath the cord. There is a slight amount of blood occasionally, but the infiltration of the posterior portion of the larynx has receded. The man sleeps well, eats well, and has gained weight. Dr. Imperatori advised against any operative procedure in this case, and advised radium. The man has done so well that he hardly needs anything, and Dr. Meierhof wished to put the case on record as one treated with radium with the results just cited.

DR. JOSEPHSON asked what treatment was administered to the glands in the case shown, as there was glandular involvement on the left side.

DR. FORBES said that one of the most interesting features of the case was the way in which Dr. Robinson had kept the histories, and that it was very pleasing to note the co-operation between the laryngologist and the radiologist. Dr. Forbes thought that the Manhattan Hospital was to be congratulated in having Dr. Robinson there.

DR. KNOPP in reply to Dr. Josephson's questions said that the gland was being taken care of by the radium. There has not been any increase or decrease, and the gland is not as large as the doctor thinks it is.

**Fibroma (?) of Tonsil on Pedicle.** Dr. Alfred Michaelis.

Dr. Alfred Michaelis showed specimen of a tumor removed from the tonsil of a woman about 40 years old. Tumor is a firm lobulated ovoid



mass about  $\frac{3}{4}$  inch long and  $\frac{1}{2}$  inch thick. The case is unusual in several respects, chiefly because this growth hung from the body of the tonsil by a thread like pedicle about half an inch long allowing the tumor to hang free in the meso pharynx. Anyone having experience, at all extended, knows that real tumors of the tonsil are seldom encountered, although supernumerary lobes are not uncommon. The specimen is exhibited in the hope of eliciting information about similar growths as the writer has not had the opportunity to look up the literature on the subject. Additional unusual features of the case are that the patient never complained of the presence of the tumor, having simply sought relief of the family physician from frequent colds during the winter. She had no very marked symptoms referable to the presence of a foreign and freely movable body in the throat. The firm and rubber-like feel of the tumor is not due to hardening fluid. This was its consistency at the time of removal, and leads to the conclusion that it is mainly fibrous tissue. There are nodules also which suggest cartilage. It is probably a mixed tumor, and the pedicle was apparently derived from a fibrous sheath.

DR. JAY D. WHITHAM said that about a year ago he had a case very much of this sort at the Manhattan Eye, Ear and Throat Hospital. This man was troubled a good deal by a growth about the size of a thumb, springing by a stout pedicle from the lower pole of the right tonsil, apparently quite moist and edematous, which interfered with his respiration and swallowing a good deal. The patient had noticed it for six weeks. Dr. Whitham removed the tumor with the tonsil. In looking up the literature on the subject the best article he found was a rather recent one in the British Journal of Rhinology. They report several cases of this nature and make the conclusion that they are of embryonic origin. The tonsil grows from the second pharyngeal cleft, and in fetal life at the third month this anlage of the tonsils can first be seen. At that time the tonsil anlage is composed entirely of connective tissue. There is no lymphoid tissue at all and there is none until just before birth and during the first year of life. This anlage is in close relationship with the second branchial arch. Everyone knows the close relationship which exists in some rare instances between the styloid process and the tonsils. These growths may possibly spring from the connective tissue fetal remains in the embryonic tonsil. A microscopical examination of one of these tumors shows it to be covered with 9—LARYNGOSCOPE N Y Academy of Medicine...7-30-23...BWG stratified squamous epithellum continuous with that covering the tonsil; within this covering is a dense core of fibrous tissue with lymphoid cells throughout the growth. A theory that seems more reasonable to Dr. Whitham as an explanation for the occurrence of these growths is that a little prominence forms at the lower pole of the tonsil for some pathological reason, and that during the act of swallowing and deglutition, and as the result the action of the pharyngeal constriction, a tumor results. It may be simply fibrous tissue at first, becoming infiltrated later with lymphoid cells from the tonsil. In other words it is a metaplasia. These growths are not so extremely uncommon. Several hundred have been mentioned in the literature.

DR. MICHAELIS said that this tumor differed from the specimen shown in that it had a string like pedicle whose thickness was comparable to heavy catgut. The tumor shown was attached to the tonsil by a broad base. There was scarcely any bleeding when the slender attachment was severed indicating a very slight nutrition.

**Dislocation of the Larynx and Upper Trachea to Left.** Dr. Geo. E. Davis.

Miss R. R., age 39, nursemaid,—came under observation April 25, 1923, gave following history of her condition. Two days previously, following some strenuous exercise while standing on chair and tip-toeing and straining to reach the top of window draping curtains, she noticed a sensation of fullness and slight pain in region of larynx. She also ex-

perienced some dysphagia on eating or drinking. No dyspnoea however, and respiration is perfectly easy. At present all subjective symptoms have disappeared.

*Examination:* Inspection externally, with the head erect and chin in line with the sternal notch shows the larynx and upper end of trachea dislocated about one half inch to left of median line and protruding slightly forward. The right lobe of thyroid seems a little enlarged.

X-ray shows mass between the esophagus and the lower half of the larynx and upper two rings of the trachea, corresponding in extent above downward from the middle of the fourth to the middle of sixth cervical vertebrae. The thickness of the mass is apparently about one and a half centimeters.

Wassermann—negative.

Diagnosis—possibly a hemotoma.

#### Acute Angioneurotic Edema. Dr. Geo. E. Davis.

Mrs. G. A. W. Referred by Dr. Martin Burke, April 19, 1923, on account of swelling of the neck and throat. The patient was awakened early that morning with a sharp, sticking pain in the left tonsil. By ten o'clock A.M. the left side of the neck externally was swollen; and internally the left tonsillar region, uvula, soft and hard palate and epiglottis were greatly edematous. Dr. Burke made incision over the palate on left, and being unable to reach me over the 'phone, sent a general surgeon to see the patient in the afternoon as the dyspnoea was rapidly increasing. Nothing further was done, however, until I saw her at 10 P.M. when I made numerous punctures in the uvula, epiglottis and over the left arytenoid, and sent patient in ambulance to Polyclinic Hospital, remaining with patient during night, having sterilized tracheotomy set ready for immediate use. The next morning, twenty-four hours from the inception of the attack, the edema had markedly subsided over the left pharyngeal region, hard palate, and uvula—but the epiglottis and left laryngeal ventricles were still involved and the edema had extended to the right side of the larynx—involving the right arytenoid and ventricle. The dyspnoea continued marked during the day, due to the laryngeal edema, and as the patient began to show decided exhaustion I had Dr. Harmon Smith see the case, who thought it advisable not to delay tracheotomy longer, but to operate while the patient was in fair condition. Dr. Smith did tracheotomy under local, and patient returned to bed in good condition. Tube was removed on fourth day, and the patient made uneventful convalescence.

Dr. LEON T. LEWALD said that this case somewhat resembles a retropharyngeal abscess radiograph that he was fortunate enough to take. A hematoma would cast a shadow just like that. Pus produced a shadow about that density and blood would do about the same thing, so the diagnosis is probably correct.

Dr. ISAAC HELLER asked if there was any fever in the case.

Dr. DAVIS replied that there was some, but that it was not high.

Dr. HELLER said that he thought these cases were acute ptomaine poisoning. He had seen two patients who had a similar condition from eating lobster. He laid the condition to the lobster, and he saw another patient that day with a condition very much like that Dr. Davis reported, although not so severe as to require tracheotomy, but with edema of the larynx, only arytenoids and the epiglottis and the case had no high fever. On the other hand he has seen a number of cases which were severe and ran a temperature of 102° to 104°. He thinks they are practically distinct conditions of edema of the larynx though the symptoms are the same aside from the fever. He believes that some acute protein poisoning has taken place.

Dr. FORBES asked what the treatment was.

Dr. HELLER replied cold and adrenalin, but that the patient was not in danger enough to require tracheotomy. The condition subsided, and within two or three days the patient was well.

## THE PHILADELPHIA LARYNGOLOGICAL SOCIETY.

January 9, 1923.

A Study of Some of the Phenomena of Asphyxia. Dr. Edward Lodholz.

Deductions from Examination of One Thousand Male Throats. Dr. Samuel R. Skillern, Jr.

### DISCUSSION.

DR. GEORGE M. COATES: Dr. Skillern's paper is bristling with points that call for discussion and I think we will get some from this gathering. He claims that 80 per cent of males have infected tonsils. I think that he is under the mark, if anything; I think it is not quite fair to judge from the men sent to the Veterans' Bureau. In the first place these men all have something the matter with them, or think they have, which is possibly the same thing. I examined between fifteen hundred and two thousand of them, three years ago. I should put the number at 100 per cent, instead of 80 per cent, as Dr. Skillern estimates it. I got so sick of putting "infected tonsils" on paper that I began to leave it off their report. Dr. Joseph Beck has said right out in meeting that he believes all tonsils should be taken out, adults and children. Sometimes I feel the same way about it. So rarely you see an adult's tonsils that do not show infection. You look at it and it appears normal. Take it out and you get something that is diseased. You can take a culture of it and it will always be positive. Eighty per cent in my mind is an under estimate rather than an over estimate.

DR. JAMES A. BARBITT: As far as pulmonary infection is concerned I think it would be of great advantage if a study of those tonsils could be made in a definite fashion. If culture could be taken from the depths of the crypts without contamination from the surface, it would be a much better argument as far as inoculation is concerned. I would like to ask Dr. Skillern if it would be practical to have this work done where he is making these observations.

DR. CHARLES ADAMS: I have gone through some similar experiences. We had an interesting example not long ago. A man developed neuritis in the right forearm which became incapacitated and finally he had to give up his work. He could not sleep. He had his teeth X-rayed and four extractions, without relief. I examined his tonsils and found them greatly enlarged. I advised him to have them out but he did not like the idea. He finally consented, so they were removed and culture made. The flora was so numerous that we were unable to isolate them to make a satisfactory report. In five or six days he had some relief from the neuritis. He left the city and came back in a few days. The pain had gone but there was a numbness in the arm. The extraction of the teeth gave no result. Vaccine was not used. As a remedy for pain I find that some people are using powdered asperin, five or ten grains. It seems to give relief which is lasting and more effective than cocaine.

DR. P. S. STOUT: For a number of years I was associated as physician in charge of Physical Education in this city. I regret to state that it is surprising what a number of apparently healthy young men have diseased tonsils. In the Veterans' Bureau the men are supposed to be ill or they would not be there. Their throats are simply frightful. I think we will have to teach parents to remove the tonsils from their children before they have grown up. It is too big a risk for their future welfare.

DR. SAMUEL R. SKILLERN (in closing): I agree with Dr. Coates that nearly 100 per cent of the men at the Veterans' Bureau have infected tonsils, and I, too, got so tired of writing it on their report that I finally

ceased to do it. Dr. Babbitt spoke of having cultures made. I think that is a good idea. At present we have not the facilities but we hope to have them in the near future. Dr. Stout referred to the large number of apparently healthy men who have diseased tonsils and I would like to state that nearly all the men I spoke of came to us with no idea that there was anything wrong with their throats. We sent them through the different departments as a routine procedure. I do not believe that one man in fifty said his throat was troublesome. When you convince them that their tonsils are infected and they get a whiff of the odor of the secretion expressed from the tonsils, their expressions are often very funny, and they are willing to have them removed.

**A Case of Macrotia, with Occlusion of the Left External Auditory Canal: Operated with Satisfactory Results.** Dr. William G. Shemeley, Jr.

*(To appear in a subsequent issue of THE LARYNGOSCOPE.)*

#### DISCUSSION.

DR. BENJAMIN D. PARRISH: I have run across many cases of macrotia, more frequently bilateral. Last year I saw an interesting case. A newly born baby had a mere dimple for an ear, and it was questionable whether it had a canal or not. If there was one, it would be interesting to preserve the hearing. I operated, turned up the mastoid bone but there was no sign of any organ except the dimple. I told the child's parents to wait until the baby grew older. These things are rather hard to explain. They often run in families.

DR. SHEMELEY (in closing): I wish to emphasize that we usually operate these cases in fear and trembling. When you have a deformed ear there is always a question whether you will have an auditory canal after you get in there. Here was a child practically deaf and we did not see that we could do any harm by attempting to remove the growth: so we gave him the benefit of the doubt and fortunately succeeded in securing normal hearing for him.

**Retrograde Esophageal Bouginage, Demonstration of Apparatus.** Dr. Gabriel Tucker.

*(To appear in a subsequent issue of THE LARYNGOSCOPE.)*

**Case of Post-Pneumatic Lung Abscess Treated by Bronchoscopy.** Dr. Louis H. Clerf.

In the consideration of lung suppuration considerable attention is now directed by the profession to bronchoscopic drainage and intrabronchial medication. I am presenting this case with not only that in mind, but also to bring before this Society the question of bronchoscopy in the early stages of this disease.

Morris B., age 50 years, occupation tin roofer, was admitted to the Medical Service of the Jefferson Hospital on July 5, 1922, complaining of cough with profuse expectoration, and pain in the right lower chest.

The family history is negative. His occupational history shows that from 1907 to 1910 he was employed in a sugar refinery and was subjected to a dusty atmosphere and the fumes of hydrochloric and oxalic acids. Developed a cough from which he states he has never completely recovered.

The present illness dates to three weeks before admission. Began with fever, chilliness, cough, and pain in the right chest. This was diagnosed by his family physician as a cold on the lung. Five days before admission began to expectorate a large quantity of foul pus. The patient was admitted to the service of Dr. F. J. Kalteyer and, from the physical signs, he made a diagnosis of lung abscess involving the middle lobe. From the history it appeared post-pneumonic in origin. Roentgenray report by Dr. W. F. Manges localized the infectious process to the anterior portion of the middle lobe. The patient was quite ill, his tem-

perature varying from 99.8° to 103.4°. There was a moderate leucocytosis with some anemia. Amount of sputum about 12 ounces daily. It was repeatedly negative for *B. tuberculosis*. Symptomatic treatment with postural drainage was instituted with little improvement.

The question of bronchoscopy was considered and on July 26th, 1922, bronchoscopy was performed by Dr. Chevalier Jackson who found pus coming from the middle lobe bronchus. The bronchial orifice at about one centimeter down was completely closed, partly by granulation tissue but chiefly by a crowding together of the bronchial wall. An uncontaminated specimen of pus was removed from the middle lobe bronchus. Dr. Jackson advised dilation of the bronchial obstruction and aspiration with the bronchoscope. The specimen of pus was negative for tubercle bacilli and showed diplococci and streptococci.

With the assistance of Dr. Tucker I did four additional bronchoscopies at weekly intervals under local anesthesia. Dilation relieved the bronchial obstruction permitting free drainage. Following bronchoscopic aspiration 15 cc. of a 20 per cent solution of gomenol in liquid petrolatum was injected into the area of suppuration. There was a marked decrease in cough and amount of expectoration so that following the third treatment the quantity expectorated was practically nil. The patient was discharged well on August 26th, 1922, the day following his fifth bronchoscopy. His weight then was 122 pounds. He returned to his work in about 6 weeks and has continued to date. He now weighs 165 pounds, is free from cough and feels well in every way.

Roentgenray examination by Dr. Manges made four months after discharge from the hospital shows marked improvement in the condition of the middle lobe.

This patient is fully recovered from the lung suppuration.

#### Post-Typhoidal Cicatricial Stenosis of the Esophagus. Dr. Louis H. Clerf.

This case is of interest because of the comparative infrequency of this condition as a sequel of typhoid fever.

This patient, male, age 14 years, was admitted to the service of Dr. Chevalier Jackson, Jefferson Hospital, on March 30, 1922, suffering from acute water starvation of five days duration. The family and personal history were negative. There was no history of any difficulty in swallowing or of swallowing any hot or corrosive liquid prior to the onset of the present trouble.

Two months before admission he had typhoid fever which lasted about four weeks and was quite a severe attack. During the convalescence it was noted that solid food could not be swallowed and soon there was dysphagia with liquids. Progressive emaciation resulted and five days before aphagia supervened.

On admission the emaciation was extreme and he was in a serious state of water starvation. He could swallow nothing, all liquids being immediately ejected. Gastrostomy was done by Dr. Shallow on the evening of his admission and he was given liquids. Roentgenray examination by Dr. W. F. Manges and esophagoscopy by Dr. Chevalier Jackson revealed a complete stenosis of the esophagus. The scarring in the esophagus began at the level of the lower border of the cricoid cartilage and extending downward ended in a stenosis 4 cm. below the cricopharyngeal fold. Esophagoscopy bouginage was instituted but the swallowing function improved slowly. During August, 1922, he was given a string to swallow and then retrograde dilation was performed using the bougie devised by Dr. Tucker. The stricture is most resistant so that progress has been rather slow. At the present time a bougie, Size No. 20 French, is pulled through twice weekly. X-ray study two weeks ago showed thin liquids passing readily through the strictural lumen which is about  $\frac{1}{8}$  inch in diameter and  $1\frac{1}{2}$  inches in length. As you see, his general condition is excellent. He can take liquids slowly.

The ultimate prognosis is very good although it will take a long time before the restoration of function will be complete.

**Case of Lymphangiectasis of the Epiglottis and Tongue. Dr. Louis H. Clerf.**

M. H., female, age 9 years, was brought to the Bronchoscopic Clinic on October 31, 1922 by her mother because of swelling of the tongue and a lump on the front of the neck. The family history is negative. This patient was a full term child, delivered spontaneously. Two days after birth the mother noticed a sac on the front of the baby's neck which she believed contained water. The tongue also was very large, protruding from the mouth, and interfered considerably with nursing. Her physician was consulted and an operation was done at that time (presumably a portion was removed). When one year of age the sac on the neck was opened and allowed to drain. The child was removed from the hospital against the advice of her physician and nothing further was done until admission to the Bronchoscopic Clinic. There has been no dyspnoea, no dysphagia nor speech disturbances. On admission the patient complained of slight pain about the floor of the mouth.

The tongue is irregularly lobulated and generally papular. It is considerably larger than normal and very firm. There is scarring about the tip and it cannot be projected beyond the teeth. The sublingual and submaxillary regions are unduly prominent and a large firm diffuse mass can be felt occupying these regions. There is slight tenderness over this area.

The epiglottis is very large and lobulated, the surface of the lobules being quite smooth. The left side is more prominent and the posterior part of the larynx is seen with difficulty. The mucosa is red in color. On the front of the neck there is a soft fluctuating tumor, oval in outline, about  $1\frac{1}{2}$  by 2 inches, overlying the sternal end of the left clavicle and extending upward. No inflammatory signs present. Not adherent to the skin.

The Wassermann test was negative. Leucocyte count was 12,600 per cu. mm.; the differential count being normal.

Dr. J. Chalmers DaCosta, who saw the case in consultation diagnosed the tongue condition as a lymphangiectasis and the cyst on the neck as a hydrocele of the neck. The appearance of the epiglottis differed somewhat from the tongue so a direct laryngoscopy was done and a specimen removed for biopsy. Dr. Wm. L. Coplin reported this to be diffuse submucosal lymphangiectasis.

Because of the tissues involved it was decided to resort to the use of radium rather than surgery and Dr. W. S. Newcomet is taking care of that phase. There has been considerable decrease in the size of the tongue; less so of the epiglottis. Dr. DaCosta advised surgery for the hydrocele of the neck if a course of radium was ineffective. There has been little change in this structure although sufficient time has not yet elapsed to determine this question.



